April 1985

An independent magazine published by EMAP Publications

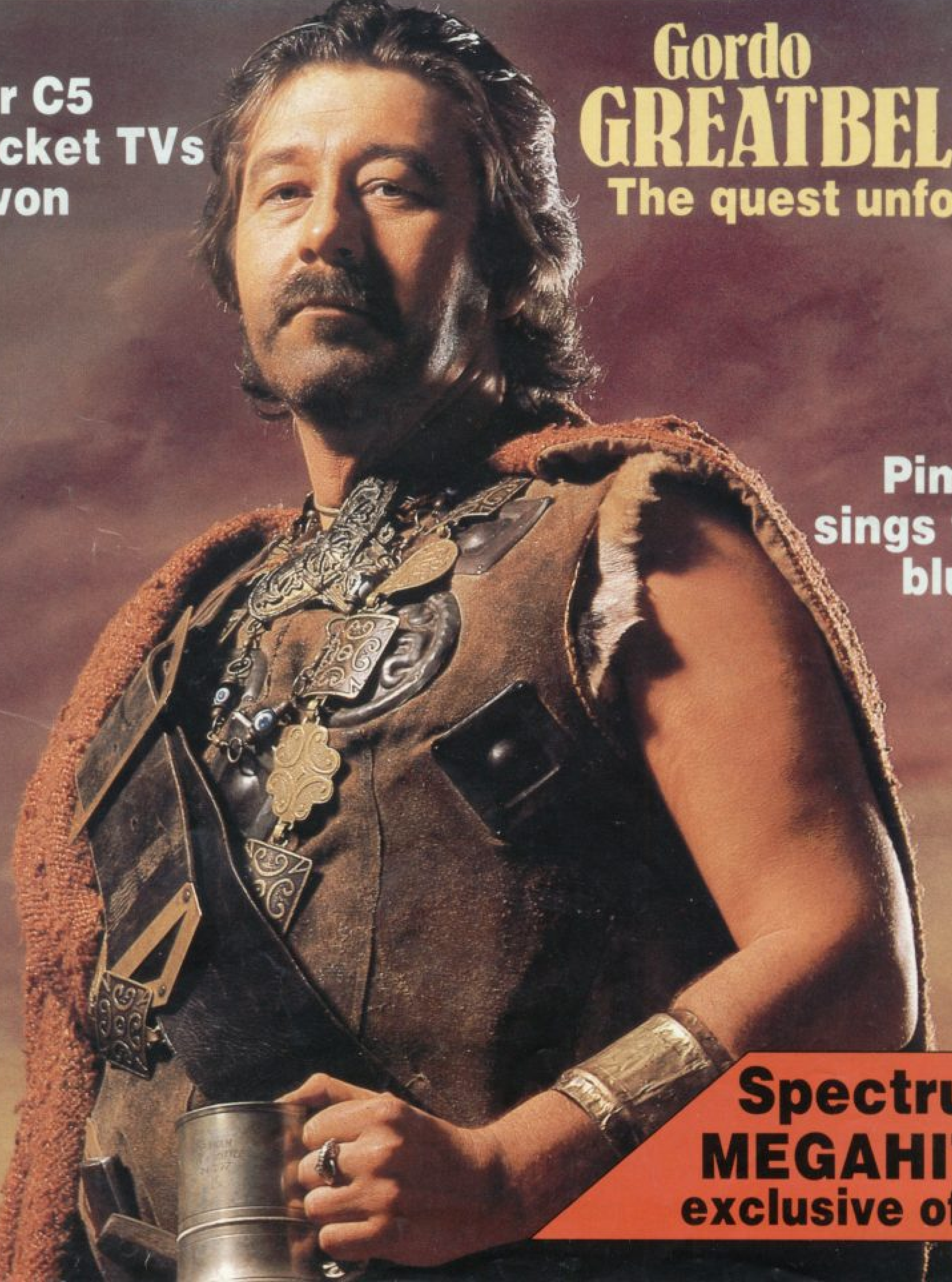
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***Sinclair User* is published monthly by EMAP Business & Computer Publications**

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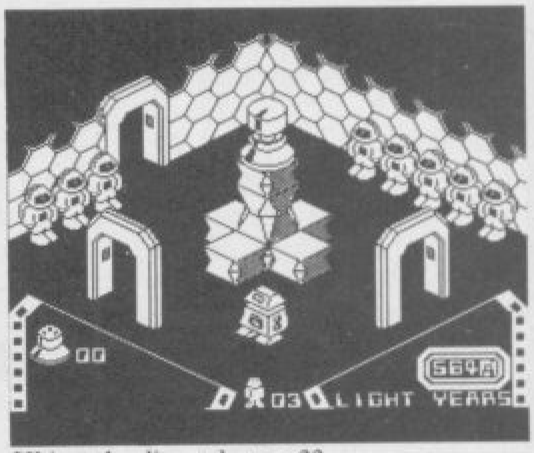


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PLUS

If you would like to contribute to *Sinclair User* please send programs or articles to:
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Original programs should be on cassette and articles should be typed. We cannot undertake to return them unless a stamped-addressed envelope is included.
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Typeset by Saffron Graphics Ltd, London EC1
Printed by Peterboro' Web, Woodstone, Peterborough.
Distributed by EMAP Publications Ltd.
 ISSN No 0262-5458

ABC 96,271 Jan-June 1984

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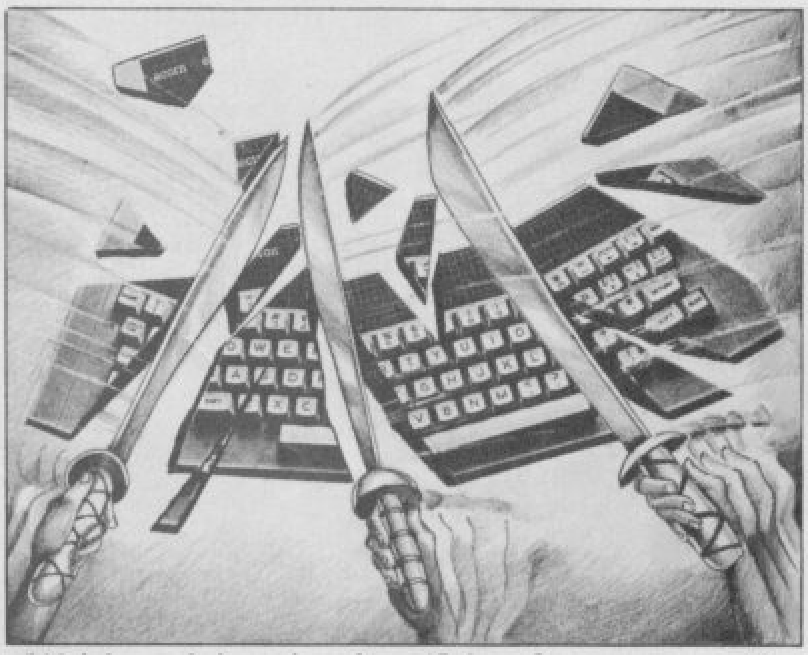
NIGHT OF THE LONG KNIVES

A YEAR AGO, in Sinclairvoyance, we reported on the bitter price-cutting war which had all but destroyed the home computer market in the States. Texas Instruments, Mattel Electronics and Timex withdrew entirely from the fray, counting enormous losses, while Atari carried on fighting, nursing its severely charred fingers. Commodore emerged as the victor, and went on to consolidate its position.

We predicted then that this would happen in Britain, and during the last three months the knives have been out with a vengeance.

Strangely enough, it was veteran campaigner Atari which declared war by reducing the price of its 800XL micro to £129.99, the second cut in three months, and just in time for Christmas. That move reflected the marketing agression of Atari's new boss Jack Tramiel, ex-chairman of Commodore, and it is Atari's avowed intention to be the "number one home computer manufacturer by October 1985".

The cut did little to help Atari sales over Christmas, and any hopes for a killing in the new year were dashed when Sinclair announced a price cut of £50 on the Spectrum Plus. Beleaguered Acorn, already a loser after a £4.5 million autumn advertising drive failed to sell anything like the expected 300,000 machines, desperately tried to fight back with a £70 reduction on the Electron.



Commodore too had a difficult Christmas, and laid off 114 workers at its Corby plant. In the States the season was disastrous, with Commodore profits down from $50 million in the last quarter of 1983 to only $3.2 million in the same period last year. The company reacted by 'temporarily' axing 540 jobs and dropping the C64 price to $150. It now looks set to slog it out with Atari, both companies pinning their hopes on new 68000 based machines to be launched this year.

Commodore UK has followed its rivals by cutting a massive £150 on the Plus/4 micro, a peculiar move as the Commodore 64 appears over-priced in comparison. At the time of writing, there were no plans either to reduce the price of the unsuccessful C16, still priced at £130.

While the big boys go for each other's throats, the smaller companies are finding it difficult simply staying alive. Casualties of the depressed state of the market already include R & R Electronics, Front Runner, Cambridge Computing, Fuller, Nordic, Stack Computer Systems and Currah. One-time Sinclair distributor Prism has called in the receivers, as has Oric. Among the magazines which have fallen by the wayside are *Big K* and *Personal Computer Games*.

Significant as those casualties are, they pale when compared to the reverberations heard when the giant Acorn tottered and fell.

Acorn was floated on the unlisted securities market over 18 months ago when the company was worth £135 million. At their peak Acorn shares touched 193p. The Electron price cuts caused a crisis of confidence which brought share prices falling to such an extent that trading was suspended at 28p a share. That followed the sacking of Acorn's bankers Lazard Brothers and the resignation of brokers Cazenove.

Fortunately for Acorn co-founders Hermann Hauser and Chris Curry, the seventh cavalry arrived in the shape of Olivetti, the Italian electronics combine which claims 15 percent of the European personal computer market. Olivetti bought 49.3 percent of Acorn at only eight pence a share. A reoganisation of the company is to follow, together with 90 redundancies in addition to the 30 announced at the beginning of February.

While Acorn looks forward to "addressing the challenges and opportunities which now lie ahead", as Curry judiciously puts it, the industry is still picking up the pieces. Among those affected is Sinclair Research, which yet again has postponed its stock market flotation, planned for March. The decision was made because of the general belief in the City that the home computer boom is over, following the Acorn crisis.

That belief has been fueled by the national press, which has pounced on the Acorn, Oric and Prism difficulties with glee. 'Home computer boom is over', screeched the *Sunday Times*. 'Sales of toy computers have peaked', pompously droned the *Daily Telegraph*.

Stockbrokers Wood, Mackensie & Co are more optimistic, predicting that "good growth in disposable incomes over the next two years should provide the basis for spending on home computers to continue to rise sharply."

Who will be the winners? It is difficult to see how Acorn, even with Olivetti's backing, can recover lost ground, while Commodore and Atari are chancing it with their proposed 68000 machines. The Enterprise might well have arrived too late, and MSX too early. Amstrad alone looks set to do well. Sinclair, as Wood, Mackensie & Co state, "should remain at the forefront" provided the QL makes 'a bigger impact' and quality control is 'drastically improved'.

This year will be the most exciting, and the most brutal, the fledgling home micro industry has yet experienced. Look out for sparks.

Bill Scolding


AT LAST...
THE AFFORDABLE ROBOT.
The Zero 2 Robot has arrived. It's the first truly micro robotic system available and remarkably it costs less than £100.
ZERO 2 ROBOT
Controlled electronically through a cable from your computer, it is equipped with wheels, pen, line follower and two tone horn. It will connect easily with the Spectrum, BBC B, Acorn, Commodore 64 and all other personal computers with a standard 'D' type RS 232 connector.
The Zero 2 Robot will add a new dimension to your computer. It is capable of precision movement to accuracies of 1mm and can be fitted with bump and hole sensors.
As a teaching aid it has endless applications and for P.C. users at home it's just great fun.
With additional software and some exciting new add-ons planned for later this year, the Zero 2 Robot will open up a whole new area of applications and games.
INTERGALACTIC ROBOTS LTD., UNIT 208, HIGHBURY WORKSHOP, 22 HIGHBURY GROVE, LONDON N.5.

Observer competition

A NATIONAL computer competition, sponsored by the *Observer* magazine, Sinclair Research and Quicksilva will be run over four weeks from 3 March in the *Observer* Sunday supplement.

The competition, open to players of all ages, will be based around Quicksilva's maze game, **Xadom.** Competitors will be required to answer three questions based on the game each week and to send in all 12 answers at the end of the fourth week.

Sixteen finalists will be chosen and the grand play-off will be held at the Metropole Hotel, London, in April where competitors will have to play two games against the clock.

Says Trevor Grove, editor of the *Observer* magazine, "We will send the 16 finalists copies of the two games before the finals for hands-on experience."

The winner will receive a QL and a two week trip to the EPCOT Center in the States, part of the Disney World complex. The three runners-up will each receive a QL, courtesy of Sinclair, and the remaining prize winners will each receive a Spectrum expansion pack and a range of games from Quicksilva.

C5 rides the waves

PRESS reaction to the C5 has been less than enthusiastic but, judging from the massive number of order enquiries, the electric trike could be put to some exotic uses.

It has been lampooned in the nationals, criticised by motoring writers and has even become a star of *Spitting Image*, the Central Television current affairs satire show. Despite that, interest in the buggy has come from some unexpected quarters.

Bill Nichols of Sinclair Vehicles Limited confirmed more than 5,000 orders and 200,000 enquiries. "We have had enquiries from a bulk container line which is exploring the possibility of taking some C5s. At the moment tanker crews have to get around large decks using bicycles. Some tankers are more than three-quarters of a mile long so the C5 would come in very handy."

Land-based uses are just as exotic. Nicholas says, "Some seaside pier companies are showing interest as there is legislation which forbids the use of motorised vehicles on piers. As the C5 is not technically a motorised vehicle, staff could save their legs using it."

Holiday camps and children's summer camps have also shown interest, according to Nichols. The camps could use the trike for both travel and entertainment.

The official C5 dealers are getting their fair share of enquiries. A spokesman for Lightning Distribution says, "We have had a variety of orders and enquiries from coastal towns, bicycle shops and garages. Response is looking reasonably good and we are looking forward to summer sales."

Meanwhile, the first C5 casualty was recorded when 65-year-old Lillian Keen took her grandson's buggy for a test drive and hit a kerb. The vehicle overturned and she broke her elbow.

The high-visibility mast, previously available only as an accessory, will now be part of the standard package. A spokesman for Sinclair Vehicles said the change was 'partly' due to criticism from safety organisations.

Blight hits as home micro companies fall like flies

THE GOOD times have gone. During the last few weeks, Prism, Oric, Stack Computer Systems and Nordic Keyboards — which took over Fuller only a few months ago — are no longer with us.

A number of factors contributed to Prism's downfall. Last year Prism ventured into several new areas, which included a range of robots — Topo and Fred — which were not as successful as planned.

A large reduction in Prism's share of the Spectrum market, and distribution problems with Oric products, were also contributing factors. Sinclair terminated its distribution agreement with Prism following Prism's decision to appoint a receiver.

Oric has found itself in the unenviable position of owing an estimated £5.5 million, especially to Edenspring Investments — its financial backers.

Oric's UK career has been dogged by bad luck. The Oric 1 was launched to compete with the Spectrum and failed miserably; the Atmos too did not do well in this country.

Nordic Keyboards took over Fuller six months ago when Fuller reported themselves to be in trouble, and with the Fuller range came Roy Backhouse, the man behind the Fuller Keyboard.

It now seems that Roy Backhouse is once again out of a job as Nordic has gone under, although, at the time of writing, finer details are not known other than that all telephones to Nordic are either out of order or have been disconnected.

Stack Computer Systems, manufacturers of the Stack Light Rifle, has also disappeared. No details are known at the time of going to press.

more news on page 8

Sherlock beaten by amateur sleuths

THE FINAL mystery of Sherlock Holmes has been cracked and this time it had nothing to do with Sir Arthur Conan Doyle.

Brothers Paul and David Cunningham from Morpeth, Northumberland are the first to solve the plot of Melbourne House's intriguing game, **Sherlock.**



Paul and David — pictured from the left — were taken out to lunch at the *Sherlock Holmes* restaurant which incorporates a room which is a faithful representation of Holmes' study — down to the dummy which Holmes placed in the window in order to catch a villain!

Software for Ethiopia

SOFT-AID the computer industry's answer to Band-Aid, which has raised so much for Ethiopia, was launched last month at the LET show by *Computer Trade Weekly* and Quicksilva.

Selling for £4.99 on the Spectrum and Commodore 64, Soft-Aid is a compilation cassette of 10 games, most of which have been in the charts at some time. Beyond's **Spellbound**, Fantasy's **The Pyramid** and Elite's **Kokotoni Wilf** will be among the games featured on the Spectrum version. Bug-Byte's **Startrader**, Virgin's **Falcon Patrol** and US Gold's **Flak** will be featured on the Commodore 64 cassette.

For every game sold about £3.00 will be sent to Ethiopia, the remainder used to offset the costs of producing the game. CTW's editor, Greg Ingham comments, "We expect it to be the biggest selling software title of all time." Sales of the game are expected to reach at least 50,000 copies each for the Spectrum and Commodore 64 which, it is hoped, will earn around £500,000 for the charity.

Micro Dealer, one of the largest distributors in the country, will be distributing the game and already W H Smith have shown support by ordering copies and promising one metre of shelf space in each of their 250 stores.

Bob Geldof has officially endorsed the game and *Feed the World* from Band-Aid is being used as backing music.

Talking about the original idea Greg Ingham says, "We decided not to release a cassette with a new game on it as the compilation is likely to generate more interest."

He continues with a warning, "If pirating starts on this it will destroy the venture."

However, piracy should not be too much of a problem as the game has been priced low enough to enable most people to buy it.



THE WINNER of the prize for completing the Ket trilogy, from Incentive Software, is Tom Frost from Montrose, Scotland.

Tom, (right), was given £400 of video equipment by managing director Ian Andrew, (left), at a presentation at the company headquarters in Reading.

Readers might remember Tom as one of the winners in the *Sinclair User* 1984 Cambridge Awards.

Sinclair relaunch in States

SINCLAIR is attempting to re-enter the North American market in May by launching the QL onto the unsuspecting American public.

The operation, headed by managing director Nigel Searle, will be based in Boston where the mail order launch will take place.

Sir Clive believes that the QL will offer "the experienced US customer outstanding value for money," and goes on to say, "I believe we have the ideal product, backed by the necessary experience and marketing skills, to spearhead our re-entry." Charles Cotton, overseas business manager, comments, "The current drop in the pound has brought about a sizeable price reduction in the QL abroad — this means the QL is an extremely competitively priced product for the professional, educational and low-end business market."

Further launches in the States will include the introduction of the flat-screen pocket TV and the FM wristwatch radio, which was first shown in the states at the CES show in January.

Sinclair has also recently strengthened its representation in the Middle East. "Sinclair Research now has a complete network of distributors in the Arab Gulf States," comments Alan Miles, Middle East manager. "We are enjoying excellent sales of the Spectrum and anticipate similar sales levels."

Charles Cotton explains further, "With such a wide range of QL software and peripherals coming onto the market, the QL has the potential of out-selling even the Spectrum."

Micronet matters

MICRONET'S latest venture, **Celebrity Chatline,** is launched at the end of March. It will give every Micronet member the chance to question important people in the computer industry.

Each Wednesday evening, starting at 7pm, Netters can send their queries by electronic mail to the celebrity, whose answers will be displayed on the database. As with the regular Chatline service, all communications will be visible to every Micronet member.

And, of course, no matter where in Britain the Net's three-person team of interviewer, inputter and co-ordinator manage to corner top computing people, the phone cost will still only be 40p per hour.

Another new service is **Headstart** telesoftware — software which loads into your computer down the phone line. Headstart will provide a special database of material for use in home education, specially aimed at Micronetters wanting a source of worthwhile educational programs.

As with the rest of Micronet's telesoftware, the Headstart material will either be free, or around 20 percent less expensive than the same programs in the shops.

Micronet access figures are reaching new heights. In each week of December 1.1 million accesses a week were made to Micronet pages, more than any other database on Prestel.

Net members proved to be a talkative lot, too, sending twice as many mailbox messages as other Prestel users.

Sid Smith, Micronet news editor

Cartridge cuts

IN A recent unheralded move, Sinclair has slashed the price of microdrive cartridges from £4.95 to £1.99.

The move is designed to encourage software houses to develop programs on microdrive and to that end a special offer of free duplication services at Ablex continues.

Sinclair also hopes that the massive reduction will help to stimulate QL sales and encourage users of both the Spectrum Plus and QL to make fuller use of their micros.

Sir Clive Sinclair comments, "Microdrives have truly come of age now and we anticipate that this technology, exclusive to Sinclair, will continue to be the preferred method of data storage for most Spectrum Plus and QL owners . . . and with the new price, software houses and members of the public will be able to exploit this versatile medium to the full."

Not all software houses will be jumping onto the bandwagon as Gordon Reid from Creative Sparks demonstrates, "It becomes a more interesting proposition, but there will be no overnight revolution. The price of microdrives is still many times greater than cassettes."

Even with the new price of £1.99 software houses may think twice about changing to microdrives when the cost of duplicating a game on cassette is only about 40 pence.

"It all comes down to greater capabilities," says Gordon Reid, "but it's the price that is restrictive."

Acorn saved in Olivetti takeover

THE ailing Acorn corporation has been rescued by Olivetti, which has purchased shares priced at eight pence and acquired a shareholding in Acorn of 49.3 per cent, with an option to increase to 50.1 per cent over the next five years.

Acorn's co-founders, Chris Curry and Hermann Hauser have had their shareholdings reduced from 87.7 per cent to 36.5 per cent.

Acorn's problems started before Christmas with poor sales figures for the Electron. Its fortunes took another dive when it had to cut the price of the machine to £130 in line with the Spectrum Plus.

Shortly after the sales figures became known, the company's share price hit rock bottom at 23 pence. It dropped from £1.73 within just one week and rallied slightly to 28 pence before trading on the Stock Market was suspended.

Before the Olivetti offer was made speculation grew about the companies that might want to take on the Acorn mantle. Sinclair Research and Thorn EMI were two such contenders. Both companies deny involvement although Sinclair would like to get his hands on the BBC contract held by Acorn and the development which has been done on a planned range of business machines.

Olivetti's executive vice president, Mr Elserino Piol, comments, "With our backing Acorn will be in a strong position to consolidate its position in the UK and to establish an effective presence in worldwide markets. We are looking forward to working together."

Acorn has announced a reorganisation plan which will split Acorn Computers into four divisions. This move is planned to considerably reduce Acorn's overheads and it is expected that a further 90 redundancies will be announced following the 30 at the beginning of February.

Chris Curry says, "It is distressing that we should have to reduce the size of the company through redundancies and I regret this deeply. However, I believe the combination of reorganisation and re-financing will produce a leaner and more focussed company."

Interactive television

A NEW television programme, *4 Computer Buffs*, is being transmitted on Channel 4 on Monday evenings.

Designed to interest the home user, the programme is launching the first ever light transmission of sound, an interactive bulletin board for viewers, telesoftware via audio tones and telesoftware which can be downloaded from the TV using the new 4-Data adaptor maunfactured by OEL.

Aptly named, *4 Computer Buffs* is on the air for eight weeks and its regular features will include weekly news and current affairs. Each week the programme shows what computer operators can achieve with a modem and the price of a local telephone call.

A specially adapted light pen is needed to receive software by light transmission and the first few programmes are employed in teaching you how to build it. The light pen's design is published in the March issue of *Personal Computer World* and the parts are available from Maplin.

OEL's 4-Data adaptor fits neatly under the Spectrum and will allow the user to store teletext on microdrives and print the data.

Whom the Gods love...

THE winners of the Deus Ex Machina competition in the January issue of Sinclair User are listed below:

J Bold, Runcorn, Cheshire; J Houghton, Lytham, Lancashire; B Mawson, Slough, Berkshire; W J Platt, Porthcawl, Mid Glamorgan; Steve Edwards, Swinton, Manchester; Gillian Welsh, Kidsgrove, Staffordshire; Neil C Parker, Highbridge, Somerset; T P Dallosso, Kenley, Surrey; Jim Timoney, Glasgow; P G Crook, Trowbridge, Wiltshire; J Burgoyne, Guisborough, Cleveland; S A Flood, Huddersfield, West Yorkshire; Mick Keyes, Woking, Surrey; E Wass, Torquay; John Yarham, Fakenham, Norfolk; Steven J Wild, Rainham, Essex; A Logie-Campbell, Cheltenham, Gloucester; Allan Wales, Northwich, Cheshire; E W. Fairweather, North Hykeham, Lincoln; Darren Lear, Rochester, Kent; Barry Hilton, Polegate, East Sussex; Bob Dennis, Wirral, Cheshire; Martin Alexis, London E16; A Allauddin, Kings Norton, Birmingham; William P Bronner, Cwmbran, Gwent; G M Sellars, Preston, Lancashire; Cory Want, Loughborough, Leicester; B R Mansfield, Bath, Avon; Richard Shaw, Bridgewater, Somerset; Robin Law, Coventry; Derek Owens, RAF Gibraltar, BFPO 52; Peter J Baker, Maidstone, Kent; Andrew Thomas, Crumlin, Newport; A J Howe, Oakham, Leicester; R A Houlton, St Helens, Merseyside; George McAtteer, Glasgow; Alan Palmer, Glasgow; E Bennett, Tenerife Sur, Canary Islands; P W Carver, Aston, Sheffield; Karen Groves, Wolverhampton; J Phillips, Chelmsford, Essex; John K Martin, London E8; Roger Northey, Tavistock, Devon; B J Coatesworth, Scarborough, North Yorkshire; Sue Spence, Northampton; Steinar Nohr, Valle, Norway; Gary Bentley, Enfield, Middlesex; Stephen Parkes, Mapperley, Nottingham; Stephen Wade, London E8; Philip Stanton, London NW11.

more news on page 10

Lack of confidence in City causes Clive to get cold feet

THE STOCK Market flotation of Sinclair Research has been postponed because of a lack of market confidence in the computer industry, due largely to the Acorn crisis.

Michael Richardson of Rothschild, the merchant bank which is handling the Sinclair listing, admitted disappointment on both his and Sinclair's part. He went on to say, however, that Sir Clive was taking the delay very calmly. Even the most brilliant financial turnover and profit would not have changed the postponement.

Sinclair forstalled comments about financial problems by releasing its unaudited management accounts for the nine months ending in December 1984. Those showed that profits were in excess of the previous year. Profits in 1983 were £14.3 million on sales of £77.7 million. Sinclair is on course for a turnover of £105 million with £16.8 million in profits.

The Stock Market listing has been put off for at least six months but the delay could be as long as a year. Sinclar Research wants to be sure that the market is stable before following the route which Acorn embarked on over a year ago.

Apple versus Acorn

A COUP planned to strip Acorn Computers of its massive lead in the educational market is planned by the American computer corporation Apple.

The company intends to give a 50 percent discount to schools on its micros which include the Apple II, Apple IIE and, probably, the new Macintosh.

Education is the main target for the BBC microcomputer — Acorn claims 74 percent of the UK market — and Apple wants to bolster its five percent share. The school scheme is the idea of David Hancock, the new managing director of Apple UK. It will also include a package of seminars for teachers which will show the importance of micros in schools and how to use them.

Hancock hopes to forge ahead of Acorn in the market early next year but his targets for this year are just as impressive. He hopes to have 25 percent of the market sewn up by July.

Commodore enter fray

COMMODORE has cut the price of its Plus Four micro in half to £149.95, following the recent reductions on the Spectrum Plus, Acorn Electron and Atari 800XL.

The Plus Four has 64K RAM, typewriter-style keyboard and a suite of four business programs. It has been hailed as Commodore's answer to the QL.

The price drop has set the retail chains buzzing as there is no cut yet intended for the C16 or the 64. Some chains, such as Dixons, have cut the price of the C16 to £99.95 but Commodore refuses to state whether the 64 is in for the same treatment.

The company has, however, cut the 64 price in the United States so a similar move could be planned for the UK later this year, when the price war gathers momentum.



New and improved Psion software

SINCLAIR has released version two of the QL bundled Psion software, and is shipping it to QLUB members as well as with new machines.

The programs, appearing 13 months after the launch of the machine, are a sufficient improvement to make the QL a convincing option as an inexpensive business machine or word processor.

Major up-grading is obvious in all four packages, with faster loading, immediate access to all commands, and some energetic debugging.

The **Quill** word processing packages now loads in 15 seconds, compared to around 40 seconds previously, and no further access to microdrive one is then necessary — the full command vocabulary being resident in RAM.

Within **Quill**, thoughtful improvements, such as the ability to swap cartridges in microdrive two without the need to re-load, and no time limit on the opening of text for insertions, have been added. Essential up-grades include the speeding of screen writing so that the cursor now keeps pace with even the fastest typist.

However, Psion has, apparently, been unable to improve the manipulation of text already present on screen, and functions such as Copy, Margins, and Erase remain painfully slow.

Several familiar **Quill** bugs have survived. The entire program can become infected with a stubborn underline function, which is passed on to new files as they are loaded and can only be shifted with a complete re-set. And the program still refuses to implement a deletion when carried out as part of a common sequence of CTRL and CTRL/SHIFT functions near the left-hand end of a line.

The improvements to **Quill** have, however, changed a scarcely serviceable word processor into one of professional quality. Along with similar improvements to the other three packages Psion has transformed the prospects of the QL.

Four drive disc

A DISC system capable of supporting four 3¼in drives has been launched by Micro Peripherals Ltd.

The system has a total formatted storage capacity of more than one megabyte and operates using an interface module which can be purchased for £99. It provides several utility routines which include a screen editor, job control facilities and file handling commands.

The first drive which you buy for the system will cost £189 but subsequent units will cost only £159.

Further information about the system and forthcoming products can be obtained from Micro Peripherals Ltd, Unit 3/4, Hassocks Wood, Wade Road, Basingstoke, Hampshire.

Sinclair's wafer drive

A WAFER drive mass storage device is on the way from Sinclair Research.

The device, which will initially be able to hold 0.5 megabyte on silicon RAM wafers, is expected to be priced at £300. Other sizes will be available if users require them.

The QL wafer drive will run on battery power. A warning light will be incorporated in the device to inform the user if power is getting low.

Nigel Searle, managing director of Sinclair Research, is confident that the wafer drive would be reliable and would provide a good alternative to Sinclair's other pet storage device, the microdrive cartridge: "The unit is undergoing some final tests but we are confident that it is reliable and data loss will be unlikely."

The massive storage capacity puts it in the range of Sinclair's other project, the Winchester disc system. It could therefore provide an inexpensive alternative to other mass storage units now available, either floppy or Winchester, for any computer on the market.

Real Time conversion

REAL TIME Systems has developed a package which will convert C and Pascal programs to run with QDOS and C/PM-68K.

The system is priced at £3,800 and will run on most 68000/68008 machines under the Unix operating system. It comprises C and Pascal cross-compilers with a library of runtime utilities for QDOS machines.

Quest Automation has a version of C/PM-68K running with its disc package for the QL and owners of that set-up should be able to run programs using the RTS package.

Computers go to college

SEVEN thousand students at Strathclyde University will each have the use of a QL by 1990.

The project is being spearheaded by Professor James Alty — head of the University's Computer Science Department — whose aim is to give all students in related subjects their own personal computers for use in halls of residence as well as on the university campus.

Sinclair Research has joined forces with the university and has donated the first 525 machines together with some peripherals and software — worth around £250,000. Andy Knott from Sinclair Research comments, "We feel that the QL is an excellent machine for this type of use and we hope this will be the first of many such projects. We're terribly excited about it."

Further support is being given by the Computer Board for Universities and Research Councils which is providing a grant of over £150,000 and Epson and MBS Data Efficiency are providing printers and colour monitors respectively.

Professor Alty, determined to use British hardware and software for the project, chose the QL as it "could offer the computing power, range of applications and above all, the portability at a suitable price."

Alty explains the need for more computers at the university: "The need is for a work station capable of some stand-alone functions such as local filing, editing and program compilation while being capable of linking to the campus network."


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Imagine that . . .



Selina gets typecast

SICK JOKE of the month was perpetrated on **Christian Penfold** of **Automata** at the Computer Trade Association dinner. **Deus Ex Machina** was voted Game of the Year despite the complete lack of support received from the self-same well-stuffed assembly when it came to actually selling the psychedelic game.

Penfold graciously thanked those distributors who had bought it . . . and read out a list of the pitiful numbers each had taken . . .

Blood continues to flow in the wake of **St Bruce**, the Svengali of the Mersey. Having joined **Tansoft** to put Oric on the map — Gremlin, February — Everiss promptly resigned when Oric pulled out of the UK. "When I learned the facts of life at Tansoft," explains God, "I thought it prudent to get out." Gremlin thought Bruce learned the facts of life years ago . . .

Imagine folk are bursting out all over now it's spring. Dave Lawson and Ian Hetherington, **Banderbotch** programmers, have been having troubles at **Fireiron**. Their company has received a multitude of unwanted post, including fire extinguishers and rubbish skips. "Some of the personal mail is disgusting," whines Hetherington. "Letters about plastic surgery and weight loss . . . it is causing distress to our families . . ."

The real power in software, transatlantic groupie **David Ward** of **Ocean, US Gold**, and a half-a-dozen other companies, says he wants to call a halt to his acquisitions. "I now own about 30 percent of the industry," he says. "I think that's about right. Much more and I would have a stifling effect on creativity. Much less and I couldn't afford to run the yacht." From the man who brought Afghan coats and Loon pants to Britain, that's very magnanimous . . .



Albert King of Welwyn – with 'moustache' – hands over the executive toilet key to Steve Currah. Can DK'tronics, which hoped to acquire Currah Microspeech, pull the chain on the deal?

Brazen Backslappers of the Month award goes to **Elite**, which is what Richard Wilcox started calling himself after **Blue Thunder** went to his head. A press release for the unplayable **Airwolf** rants on about selling 50,000 copies in six weeks. The trouble with figures like that is you never know whether they represent a fit of lunacy on the part of a tired and emotional distributor or a reflection on the tastes and intellects of the public.

Anyroad, Wilcox intends to continue his masterplan of buying the rights to dire American TV series and turning them into lousy arcade games with the **Dukes of Hazzard**. We are promised 100 screens of the General Lee performing wheelies, tumbling, jumping and ultimately, crashing? . . .

Crashing is what **Eddie Kidd**, the motor-cycle stuntman, should know a lot about. Martech, which produces **Eddie Kidd's Jump Challenge**, the poor man's answer to Daley's Decathalon, announced the winners of its longest jump competition. Craig Billington managed 25 cars on his Spectrum 48K. His prize? The unlovely Toshiba MSX computer. About as much use as the game is fun . . .

Martech is certainly going a bundle on the sweatier end of physical activity. Soon to come is **Brian Jacks' Superstar Challenge** in which the ageing athlete takes you on at arm-dips and squat-thrusts, whatever they are. If that isn't gruesome enough, try **The Living Body** and build a blood system with **Christian 'spare parts' Barnard**. Yeucck . . .

Talking of bad taste, fret not about the effect on **Sir Clive's** tender feelings caused by his frequent appearances on *Spitting Image*. Gremlin is reliably informed that Uncle was one of the original sponsors of the show, but pulled out for unknown reasons.

Reports suggest the first sketch to feature him, in which he invented the smallest version of something which cannot be printed in a family magazine, had him overjoyed with his sudden fame. "I've become a household name," he crowed, and videoed the sketch. But is it true that he insisted on playing the recording to all his staff? . . .

Slugger may not be quite so happy about a new game from **Amsoft**. The game features two captains of industry hurling computers at each other. If the Clive lookalike loses, he gets carted off to hospital in a C5. What, asks Gremlin, happens if Curry is vanquished? Perhaps he ascends to heaven on an Italian typewriter . . .

For **Bob Neill**, heaven *is* a typewriter. He has been 'producing exquisite pictures on his typewriter for over 20 years'. He is also a hypnotist, which is presumably why *Bob Niell's Second Book of Typewriter Art* sends you to sleep.

Bob 'quiet and charming' Neill has had his work featured on Radio Kent. How in the name of Bruce did they broadcast the pics? The book contains instructions for producing artistic portraits of Prince William, the Blue Peter dog, Barry Manilow, and other horrors. No Clive, but we reproduce one of his partner in wax — Gremlin February — to whet your appetites . . .

Leonardo

SIMPLY THE MOST ADVANCED SPECTRUM GRAPHICS PACKAGE.

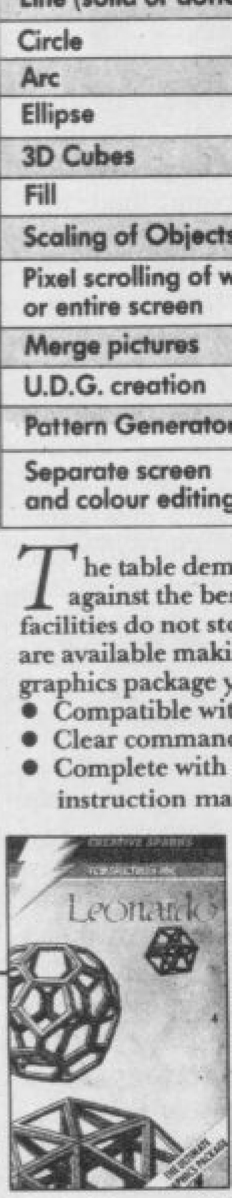
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Scaling of Objects	●		●	
Pixel scrolling of window or entire screen	●		●	
Merge pictures	●			
U.D.G. creation	●	●	●	●
Pattern Generator	●			
Separate screen and colour editing.	●	●		

The table demonstrates the capabilities of LEONARDO against the best selling similar packages. LEONARDO'S facilities do not stop there however. In fact over 65 commands are available making this the most advanced and useful graphics package yet produced for the SPECTRUM 48K.

- Compatible with all leading joysticks.
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ZXLprint III interface enables your Spectrum computer (16 or 48K) to print on almost any dot matrix or daisy wheel printer with RS232 or Centronics input. Just plug in ZXLprint III and LPRINT and LLIST commands will work. COPY works without any software on Epson, Star Delta, Brother HR5 & 1009, Gemini, Walters WM80, Mannesman MT80, Kaga Taxan, Cannon, Shinwa, Seikosha 100, 250 & 500. Plus Seikosha GP700 in FULL COLOUR. Also available is optional COPY in 4 colours on CGP115, MCP40 & 80 and SCP80.
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Yet more bugs found in free booklet

BROWSING through the free booklet '50 Tips for Better Sinclair Computing' I noticed an unfortunate error which may send some beginner potty.

Item 33 states that POKE 23617,8 will give you Caps Lock and the 'C' cursor. This does as you say but that's as far as it goes. Your example program will corrupt the keyboard entries and, funnily enough, disables the BREAK key.

The proper POKE to use is POKE 23658,8.

**Paul Calleja-Gera,
Cheltenham**

THE USER-definable graphics are not always stored at address 32600 — this is true for 16K Spectrums only. The address of the first byte of UDG 'a' is found by: PRINT USR "a", which on a 48K Spectrum is normally 65368.

The simplest way of finding the amount of free memory is by using the ROM free memory routine: PRINT 65536 — USR 7962 which works for both 16K and 48K Spectrums.

**Kevin R Browne,
Wakefield,
West Yorkshire**

ITEM 25 was misleading when it stated that there were no codes to alter the paper colour. There is — go into extended mode and then press the number for the required colour.

Item 26 introduced programmers to character codes, but the example given was enough to put anybody off using them for life! Why print "HELLO", when you can simply type PRINT CHR$ (72) + CHR$ (69) + CHR$ (76) + CHR$ (76) + CHR$ (79) instead?

Item 50 was completely wrong. The formula 'PRINT INT (RND * end of range) + start or range' is a load of rubbish. Any Sinclair programmer should have known that using random numbers is nowhere near as simple as the author suggests. PRINT INT (RND * 7) + 3 does not select a number between 3 and 7 as stated, but between 3 and 9.

The correct formula is: INT (RND * b−a) + a, where 'a' is the start of the range, and 'b' is one more than the end of range.

These major mistakes apart, I thought the booklet was very interesting.

**Simon North,
Pontefract,
West Yorkshire**

● *We apologise for the errors in the booklet, some of which were corrected last month. Most occurred from typing the programs and then having them set, instead of using printer listings. Other problems occur with items 34, 36, 44 and 47.*

*Tip 34: Line 60 should read LET DEC = DEC +VAL(A$(N))*2 ↑ (x-n)*

*Tip 44: Line 70 should read LET B=B−(B›64)*55−(B‹58)*48*

Tip 47: Lines 130 and 220. The last part of both lines should read A$(X+1, 1 TO)

Tip 36 contained a major error. It is listed in proper form below without the errors.

```
 10 LET sub=1: LET dec=0
 20 INPUT "hex";h$
 30 LET n$=h$(LEN h$)
 40 LET h$=h$(1 TO (LEN h$-1))
 50 GO TO 120
 60 IF LEN h$=0 THEN  GO TO 70
 65 LET sub=sub*16: GO TO 30
 70 PRINT "denary:";dec
110 GO TO 10
120 LET f=CODE n$
130 IF f<58 THEN  LET l=f-48
140 IF (f<71) AND (f>64) THEN
LET l=f-55
150 IF (f>96) AND (f<103) THEN
 LET l=f-87
160 LET dec=dec+l*sub
170 GO TO 60
```

Ludicrous Clivemobile

WHATEVER will Sir Clive think of next? The Spectrum was his peak but now he is rapidly going downhill.

It started with the QL and the microdrives. We all heard of them, about a year later we saw them and now I see hardly any. Then came the Spectrum Plus. This a touch too expensive for a plastic jigsaw puzzle.

Clive's latest idiocy is the C5. This mobile deathtrap should not be allowed. It cannot be put alongside fast cars in heavy traffic. It is much too slow and small.

As for 14 year olds driving it without tax, licence or insurance, it is ludicrous.

Sir Clive reckons that by the 1990s he will have a range of 'fast, quiet, astonishing family vehicles' on the road. He is in a dream world. By the 1990s no one will have any faith in him at all.

**Dietmar Osman,
Farnham, Surrey**

Ghost in the machine

AS A member of the Association for the Scientific Study of Anomalous Phenomena I am interested in cases of anomalous computer effects.

Can I appeal to readers for any information, at first or second hand, no matter how bizarre, concerning unexplainable malfunction or unexpected output?

All accounts will be treated in strictest confidence.

**Roger C Morgan,
15A Kensington Court
Gardens,
London W8 5QF**

Vicious propoganda

I HAVE been a reader of *Sinclair User* for some time and I find it a very useful and well written magazine.

I was very disturbed, however, to see the advertisements on pages 14 and 109 of the February issue. That on page 14 seems a typical move to dump a load of American rubbish on the British market and I take particular exception to the game **Raid Over Moscow.** Imagine the uproar if a Soviet firm produced a game called Raid Over New York.

Afghan Attack is equally objectionable. Perhaps Grenada or El Salvador would make good sequels?

I do not intend to buy this vicious propaganda nor the magazine it is advertised in.

**J H Leatt,
Broadstairs, Kent**

● *Rob Cameron, advertisement manager, replies: It seems to me that such games are symptoms of an ill greater than we could put right through* Sinclair User. *All shoot-'em-ups are inherently violent and whether the enemy is the USSR or greenies from outer space makes little difference in the final analysis.*

● *Bill Scolding, editor, replies: Neatly side-stepped, Rob. What price scruples, eh?*

Software turkey call

BEING a regular reader of your mag I thought it would be a good idea for people who have bought an awful game to write in.

For instance, I have purchased a game called **Auf Wiedersehen Pet** by Tyne Software. At first the graphics and playability were quite high but after reaching a score of 47000 the game just crashes in the bier keller.

I think that the companies concerned spend more time on the packaging than sorting bugs in the programs. Maybe it would be a good idea if there were a black-list of games which are just not worth the money — **Hungry Horace, Planetoids** and **The Black Hole.**

Games like **Booty** will give you more enjoyment at half the price.

**Billy Weir,
George Gibson,
Bathgate,
West Lothian**

more letters on page 18

Are software houses missing the point?

I WOULD like to add my comments to your excellent article Software Chainstore Massacre — *Sinclair User*, Feb 1985.

Games in the £10 to £20 bracket are common, and whilst some are of reasonable quality, the price of many is difficult to justify.

There are other practical points which software houses seem to be missing. Games for which joystick control is advantageous should support all three of the common Spectrum interfaces. Sound effects may not suit all users all the time, so why not allow sound to be switched off? A pause facility is essential, and how about being able to save and reload league tables?

As stated in the article, software should whenever possible be in a standard cassette box, making storage easier, as well as tidying display stands in the shops. This should not be at the expense of proper documentation, however — **Figher Pilot** shows how it should be done.

Software houses still seem to be producing what they think customers want, rather than finding out what the demand really is. In time, they must produce more original products — and not just games — at realistic prices, or more will suffer the inevitable.

Peter Biss,
Weybridge, Surrey

Christian micro users

THERE is a great need to discover the few individuals and companies producing Christian software and even more to share the expertise and ideas of the many individuals who have sought to use micros within their church activities.

Anyone sending a large SAE to the Christian Micro Users Association at the address below will receive a sample magazine and further details.

P A Clark, Secretary,
6 Walkley Street,
Sheffield S6 3RG

Clive is misinformed

THE remark about Indian villages made by Sir Clive Sinclair in your February issue reveals that he is not only patronising but sadly misinformed.

India's food production has been rapidly increasing over recent years and she is now a net exporter of grain. Her manufacturing base is also growing, and her people hardly need looking after.

Perhaps an 'intellectual machine' should be dropped in Camberley to teach Sinclair Research how to 'look after' their customers.

Dr T Lewis,
Carmarthen, Dyfed

How to save Columbus

MAY I congratulate Nicholas Holgate on his stimulating program **Columbus,** published in the January issue. I did, however, have to delete line 6700 LET b(k,7)=z to get it running correctly.

As the game takes a very long time to play I have added a Save Game routine, which might be of interest to other colonists.

Change line 7900 to:

```
7900 INPUT "SAVE GAME? (Y/N)" ;x$
7910 IF x$="y" THEN GOTO 9800
7920 GOTO 200
```

and add

```
9800 SAVE "Columbus" LINE 7000
9810 INPUT "CONTINUE? (Y/N)"; x$
9820 IF x$="y" THEN GOTO 200
9830 STOP
```

— though lines 9810 and 9820 are not necessary.

To play a SAVEd game, load the graphics program — Listing 1 — as usual, but when told to restart the tape, play your saved tape instead. You will be brought to the yellow 'all decisions made' page to recap on your position.

Patricia Richardson,
Maidstone, Kent.

Arcade action

Rocketman

I HAPPENED to notice Ashley Morris' letter in the February issue about his problems with flying the vulture in **Rocketman.**

As the vulture follows the stages in which the player has to use a rocket pack — where the 'thrust' key can be depressed to provide rocket power — it seems to be assumed that the vulture will operate likewise. However, it is unlikely to be jet-propelled. The vulture, rises a little with every flap of its wings, so the more you flap the higher you fly!

The wings move downwards when the FLAP key is pressed, lifting the bird slightly and will return to the up position when the key is released. By repeatedly pressing and immediately releasing this key the vulture can be made to happily flap around the screen.

J N Chappell,
Software Farm, Bristol

Monty Mole

IN REPLY to Alan Scott's letter on **Wanted: Monty Mole,** in February.

If you collect all the pieces of coal, including the one in the room, the wall will disappear. Also collect the axe and go up the rope until you are level with the floor and wait until the genie is just past you, then jump onto the floor and run along and rush down the rope. If you kill the genie you cannot get past the cartwheel. Then you can get into the next screen.

Mark Harrison,
Cheadle, Staffordshire

Skool Daze

FOR ANY of you having trouble with **Skool Daze** here are the dates of some of the battles:

Hastings 1066; Waterloo 1815; San Jacinto 1265; Trafalgar 1805; Balaclava 1854; Flodden 1513; Yorktown 1781; Shrewsbury 1403; Poitiers 1356; Sedgemore 1685; Evesham 1265; Lexington 1775; Borodino 1812; Lepanto 1571.

You often get lines for being knocked off your seat because there are too many pupils. To stop that happening in Geography, follow Mr Withit to the end of the room and he will turn round and start teaching the class without noticing you. In the reading room sit at the back as no-one else tries to sit there.

There are two timetables, parts of which are detailed below:

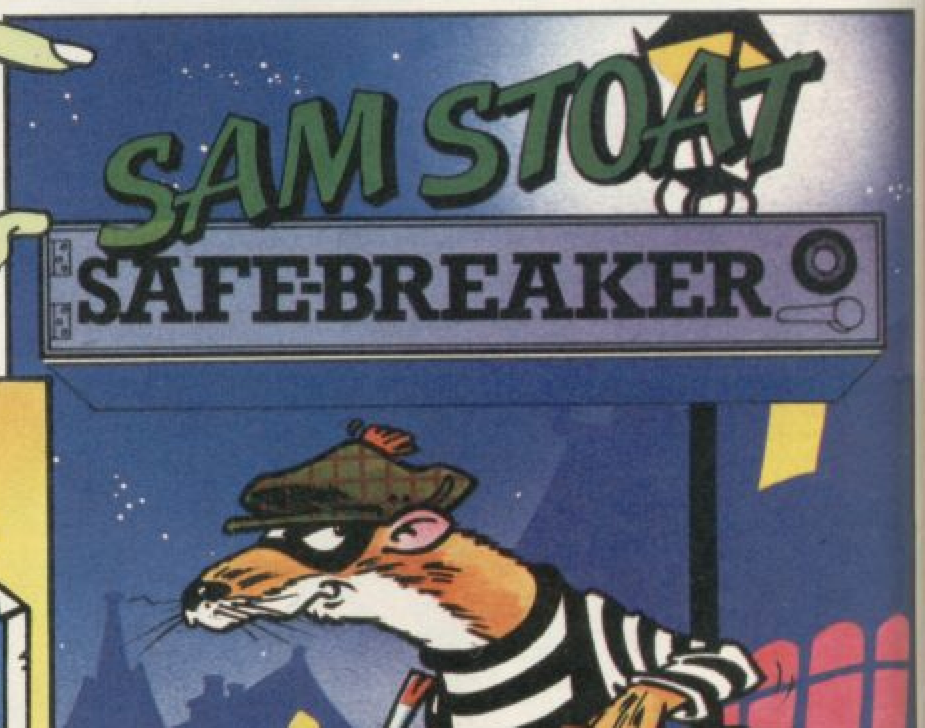
Playtime / Map room / Revision — Library / White room / Playtime / Reading room / White room / Playtime / Dinner / Playtime /?

Playtime / Exam room / Map room / Playtime / White room / Reading room / Playtime / Dinner / Playtime / White room / Revision — Library / Playtime / White room/?

T S Nicholson
Wirral,
Merseyside


THE REVIEWERS ARE RAVING!..
GIFT FROM THE GODS
Pick of the week
Unique strategy adventure
Likely to be the big hit of 1985.
SPECTRUM 48K
9.95
A gift fr
the
Ratings
Title and rating: Gift From The Gods*****
Type: Arcade adventure.
Computer: Spectrum 48K.
Format and price: Cassette, £9.95.
Publisher: Ocean.
In brief: Classic romp.
AN epic adventure to challenge ... recent rele... created by a gr... former Imagine programmers.
Help comes from the spirit of Electra and hindrance from Clytemnestra—your mother, no less—who steals shapes and makes a nuisance of herself.
There are also snakes, spiders, three-headed serpents, spitting skulls and other horrors to deal with.
Likely to be the first big hit of 1985.
Scores
ocean







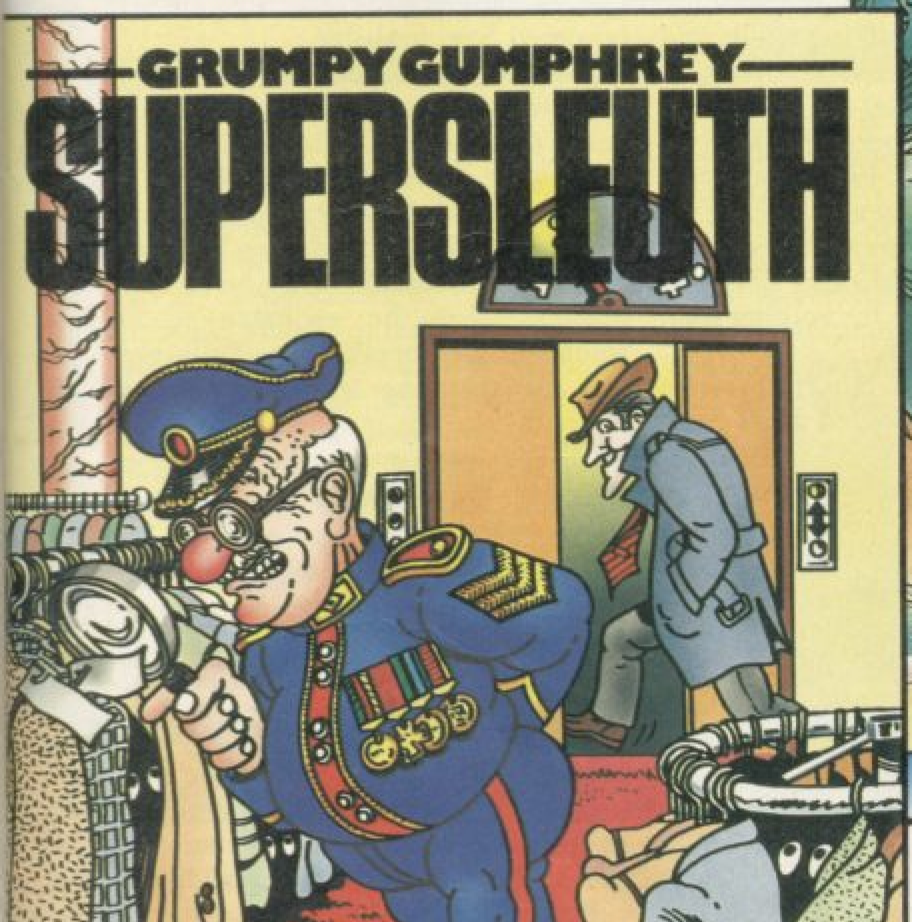
At the dead of night Sam leaves his lair and makes for the large houses where, with the aid of some everyday tools and a good measure of cunning, there are wealth and riches for his delight (not to mention his pocket). It couldn't be easier. . . sneak into the house, find the safe; light the blue touch paper and stand well back. Then out into the night with the ill-gotten gains! But Sam has reckoned without one or two adversaries who are more than a little determined to get the better of him. . .

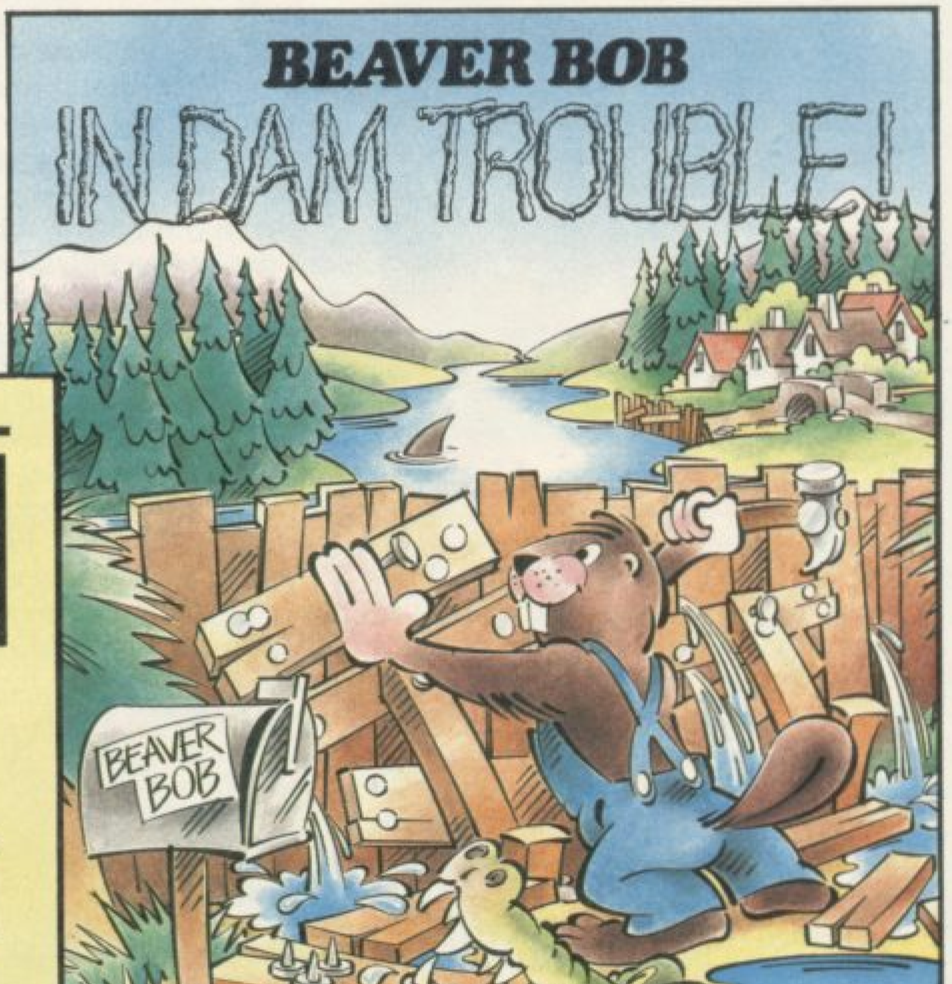
A cry of national outrage! Poor Monty banished for life amongst murderers, arsonists, the lowest of the low. Fear not, this Mole is innocent, and plans are in hand to rescue your Superhero. Who is the mysterious masked rodent willing to challenge death for his lifelong friend? What are the evil forces working in Scudmore Prison?

OTHER GREAT TITLES FROM GREMLIN:	
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Monty Mole	CBM 64 **£7.95**
	Spectrum 48k **£6.95**
Potty Pigeon	CBM 64 **£7.95**
	Spectrum 48k **£6.95**

OU'VE NOT GOT THE LINS, YOU DON'T KNOW AT YOU'RE MISSING!

x serviceman Gilbert Gumphrey, drummed out of the rmy in 1946 because of his acute short-sightedness has een struggling to hold down his job as a store detective for he last thirty nine years. But things are hotting up for ilbert, known to all as "Grumpy". Now that times are ecoming harder and staff made redundant, he has to erform all kinds of tasks; not only catching thieves, but aging the gorilla and tidying the warehouse, otherwise he night find himself surplus to requirements too! Can Gilbert ang onto his job? You can help him, but be warned — this s no ordinary department store!





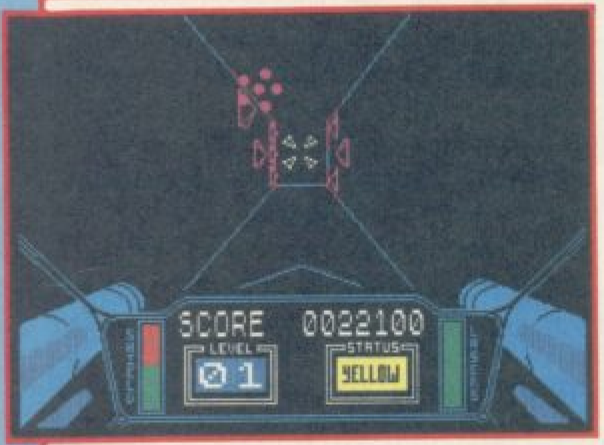
Poor Bob! All he wants is to lead a quiet life and build his dams. But the peace is soon shattered when the local townsfolk find their taps running dry. Bob's dams are plainly to blame so as soon as he completes one, the locals blow it up! And that isn't the end of Bob's troubles either, for there are sharks, crocodiles and all manner of underwater hazards for him to negotiate. Help Bob in his never ending struggle to build his dams and avoid the predators that lurk in the deep.

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3D Starstrike

IN THE darkness of space the Outsiders gather to launch a final attack on the free galaxies. The only way in which you can save ensure their continuing freedom is to buy a copy of **3D Starstrike** and track down these space cowboys who insist on zipping around the universe in X-wing fighters which look as though they have been high-jacked from *Star Wars*.

By that we imply no criticism of the program. Gamers who enjoy blasting space ships, and who probably still own a copy of **Space Invaders**, will enjoy it.

Take your position in the cockpit of a Starstriker and battle through the hoardes of Outsiders, all shown in line-construction 3D which has become statutory in such games, to the star base from which they launch their sudden attacks.

Once you have entered the base you must take your ship through a narrow passsage, avoiding the ground defences and destroying the tops of towers which block your way. Once past the first stage it's on to the second where you must give a repeat performance.

The only aspect of the game which changes to any notable degree is the score. Thousands of points can be achieved, even on the higher levels, in a matter of minutes using the ultra-manoeuvrable cannons. The enemy, totally incompetent and probably blind, if the accurancy of their lazer bolts is anything to go by, happily shoot on and off the screen until they are shot down in a collection of little 3D pieces.

If **3D Starstrike** had been brought onto the market a year ago it might have taken it by storm. Unfortunately it combines elements of other turkeys such as **Terrahawks**. That is a bad selling point especially since success is usually gauged by originality or programming prowess.

John Gilbert

3D STARSTRIKE
Realtime Software
Memory: **48K**
Joystick: **Sinclair, Kempston, Cursor**
Price: **£5.50**
Gilbert Factor: **7**

Monty is Innocent

IN THE archives of the most notorious prison escapes is the story of one, Monty Mole, who was slammed in the jug for borrowing a bucket of coal one cold night to warm his frozen paws.

"Monty is innocent", thought Sam Stoat and so he decided to arrange his best friend's escape.

Sam scaled the high walls of Scudmore Prison and went to sniff out Monty. Had he known of the horrors in wait he would not have set out on his mad caper, for guarding Scudmore were mad axemen, walking skulls and ghosts of past inmates.

Once inside, Sam set off to find the Governor's office where the keys to the cells were hidden. Finding the safe he picked a likely key and scampered towards the cells. More frustration followed as Sam could carry only one key and had to return for another each time he opened a cell.

The prison was a labyrinth, with some rooms to be avoided at all costs — solitary confinement cells from whose confines death was the only escape.

Eventually he found the armoury and, now armed, he despatched many guards to their graves. There was also the phenomenon of the potion, which rendered Sam invisible.

Afterwards he confessed that he got very worried when his stomach or head disappeared, which happened every time he ran into one or two of the nasties — the surroundings flickered and merged and lost all their colour and definition. Despite that, he recommended the escapade to all would-be gaol-breakers as a pleasant way of spending a harrowing few hours.

Clare Edgeley

MONTY IS INNOCENT
Gremlin Graphics
Memory: **48K**
Price: **£6.95**
Joystick: **Sinclair, Kempston**
Gilbert Factor: **7**

Falklands Crisis BMX Trials

WHILE to many the Falklands war is an episode best forgotten, to others it is a heaven-sent opportunity to unleash tedious games upon a vulnerable public.

The Falklands Crisis is described as 'a good combination of strategy and arcade'. It is neither.

You guide a white harrier jet across some peculiarly shaped green islands, shooting up enemy aircraft and installations. If you hit them a little cloud of smoke appears. If you are hit then you putt-putt-putt into oblivion.

You aircraft can go up and down, turn left or right. There isn't really anything else to say about it. Oh, yes, — you get three lives.

BMX Trials features an equally uninspiring screen display in which a red bike accelerates across a jungle landscape — well, it's green at any rate — hopping over trees, huts, ravines and arrows. There are some bees and bubbles thrown in for good measure. If you run into anything then that object turns red, presumably from the blood of the deceased biker.



Both games are awful.

Llainlan Software can be avoided at Pontyberem, Llanelli, Dyfed.

Bill Scolding

FALKLANDS CRISIS
Llainlan Software
Memory: **48K**
Price: **£9.95**
Gilbert Factor: **3**

BMX TRIALS
Llainlan Software
Memory: **16K**
Price: **£6.95**
Gilbert Factor: **3**

Alien 8

THE ROBOTS are back in the latest game from Ultimate, creators of **Sabre Wulf** and **Knight Lore**. After four arcade adventures on fantasy themes, the wizards of hi-res graphics are plundering space again.

Alien 8 puts you in charge of a large spaceship carrying deep-frozen spacemen — 'cryonauts' — to a new planet. But alien life forces penetrate the ship and threaten to de-activate the refrigeration chambers. You, as the robot, must find the thermolec valve for each chamber to re-activate it.

Alien 8 is as close a copy of the very popular **Knight Lore** as a program can be. It uses exactly the same 'filmation' technique to show a 3D chamber in astounding definiton, full of traps and objects to test and puzzles to solve. Your character can push some of the objects around, using them as platforms, and the 3D animation extends to your character disappearing behind obstacles.

Where the game improves upon **Knight Lore** is in the plot and problems. In the earlier game objects had to be taken to a central room, whereas now you must ferry them to 24 different crychambers to win. That extends the number of potential solutions enormously. The individual problems are much more tightly constructed and offer greater variety. In some rooms you must shift blocks around extensively to construct an appropriate stairway; in others the solution is apparently impossible unless you experiment, whereupon a key move may send blocks sliding or even vanishing to reveal your goal.

The general quality of the graphics is slightly higher, although using an apparently identical system to **Knight Lore**. The character moves a little quicker as well. Fans of the earlier game will need no urging to rush out and buy it. Those who have neither game should buy **Alien 8** now, and find out what the fuss is all about.

Chris Bourne

ALIEN 8
Ultimate
Memory: **48K**
Price: **£9.95**
Joystick: **Kempston, Cursor, Sinclair**
Gilbert Factor: **9**



Witch's Cauldron

WHY IS life so tough? There you are minding your own business, an ordinary human on the Clapham omnibus, when Hazel the witch arrives and turns you into a slimy toad.

Hazel has now imprisoned you in her island home and, naturally enough, you want to become human again and get back to Clapham. You must go through a series of transformations by using spells, potions and all other magical impedimenta lying around Hazel's dwelling. Warning — this won't be easy.

The game is a text adventure with superb location graphics. As you move around the rooms, — whether you happen currently to be a toad, cat, ape or whatever — you are shown in the position you have moved to — on top of a sofa, under the piano. In this sense the graphics are interactive.

The program is technically polished



with a large vocabulary and about 100 locations. You can type in reasonably complex English and the input is very firm, allowing fast typing.

The plot is inventive and good-natured whilst the business of finding the correct things for your next change is quite tantalising. Change too soon and you may find you've missed something you could have done only in a different shape.

The Witch's Cauldron should be entertaining enough for the whole family. Splendid fun!

Richard Price

WITCH'S CAULDRON
Micro-Gen
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **7**

Astronut

SOFTWARE Projects, a company responsible for bringing out more repeat plots than *Dynasty*, has done it again with a new space hero called **Astronut.**

He is a galatic Willy but without the bounce to get him out of trouble. His chums in the space freighter, headed for home planet CS, have thrown him out to collect resource blocks, blown from the ship in a meteor storm.

Luckily, the ship has crashed on an unknown planet, which has ladders and levels, so you do not have to swing around in space. You can also select which level you want to enter, unlike **Manic Miner** or **Jet Set Willy.**

The monsters include jiving robots, jumping green fish and spinning rotary saws. To destroy them you drop bombs but be careful as explosions have a time delay of several seconds.

When you reach a block push it down the levels to the ground and onto the flashing transporter pad where it will be beamed over to the ship. When you have placed one block on the transporter another will appear and you repeat the process.

The game is difficult enough, and high scores are a luxury, but when first loaded there are no instructions for travelling to the various levels or for getting into the game. You are not even told how to drop bombs, though with a joystick it is easy. An attempt should have been made to include minimal instructions.

John Gilbert

ASTRONUT
Software Projects
Memory: **48K**
Price: **£7.95**
Joystick: **Kempston**
Gilbert Factor: **7**

more software on page 24

Spectrum Software Scene



Alien

TERROR stalks the corridors of the spaceship *Nostromo* as the alien devours the crew members, inexorably, one after the other. If you thrilled to the haunting and genuinely scary movie, **Alien** provides an authentic recreation of the plot.

You control the crew of the *Nostromo*, by manipulating the characters through a series of menus. You can use a joystick to move the cursor to the various instructions. A plan of the three decks displays the current position of the character you are controlling, and reports beneath send messages concerning the status of characters or damage to the ship.

To win you must either herd the alien into an airlock and blow it into space, or destroy the *Nostromo* while escaping in the shuttle *Narcissus*.

As in the film, the characters have minds of their own and will behave accordingly, sometimes disobeying orders if they are too scared. Jones, the ship's cat, is an infallible guide to the nearness of the alien. Unfortunately, you cannot launch the shuttle without first rescuing Jones, and the cat only likes certain crew members.

Whenever doors or ventilation grilles are opened, there is a corresponding whoosh from the Spectrum, and an electronic tracker, when found, beeps if anything is moving in an adjacent room.

Although the graphics are symbolic, and the representation of the alien less than frightening, there is a tremendous tension in playing the game, and scope for extremely complex tactical decisions. When all you can hear are the sounds of the alien approaching, panic can easily set in.

Chris Bourne

ALIEN
Mind Games
Memory: **48K**
Price: **£8.99**
Joystick: **Kempston, Protek, Sinclair**
Gilbert Factor: **7**

Lazy Jones

THE rationale behind **Lazy Jones** has you as the laziest hotel cleaner in the business, avoiding managers and lethal cleaning carts by nipping in and out of the 18 bedrooms.

But you can forget about all that, because the real rationale of this game is merely to string together as many feeble versions of ancient arcade games as the Spectrum memory will tolerate. Behind most of those bedroom doors lurks a screen and joystick, and the next thing you know is that you're playing one of the many arcade games which you hoped never to clap eyes on again.

There are shoot-em-up games, platform games, centipede games — you name it, Lazy Jones has to play it. After a while you are preferring death from the hotel manager to another bout of 'Res Q' or '99 Red Balloons'.

The graphics are adequate and, to be fair, the game has a certain novelty going for it, albeit short-lived. What really frightens is that in the not-too-distant future, Terminal Software might be encouraged to launch Lazy Jones II in which one of the many computer games played in those hotel rooms is Lazy Jones I in its entirety.

This series could run and run. Aarghh!

Bill Scolding

LAZY JONES
Terminal Software
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston**
Gilbert Factor: **4**

Drive In

DRIVE IN from Fantasy has not, as the name might suggest, anything to do with burgers and movies — instead it is set round a drive-in garage somewhere in space.

Dezzy's space ship is disintegrating. With no spare parts she finds an old drive-in where hopefully she will be able to find some rusty replacements.

The garage is a confusing jumble of rooms and objects, half of which seem to have little to do with the game. The object is to pick up spare parts which must then be assembled in Room 189 — the only room with a number.

Some rooms contain banks, swap shops and time machines which must be used if Dezzy is to survive.

You will come across the symbols of those facilities early on in the game but identifying each takes rather longer. Objects placed in the bank are swallowed and never seen again.

Certainly a game to tax your ingenuity and patience and one which might tempt you to throw your joystick away in frustration. *Clare Edgeley*

DRIVE IN
Fantasy Software
Memory: **48K**
Price: **£5.50**
Joystick: **Sinclair, Protek, Kempston**
Gilbert Factor: **4**

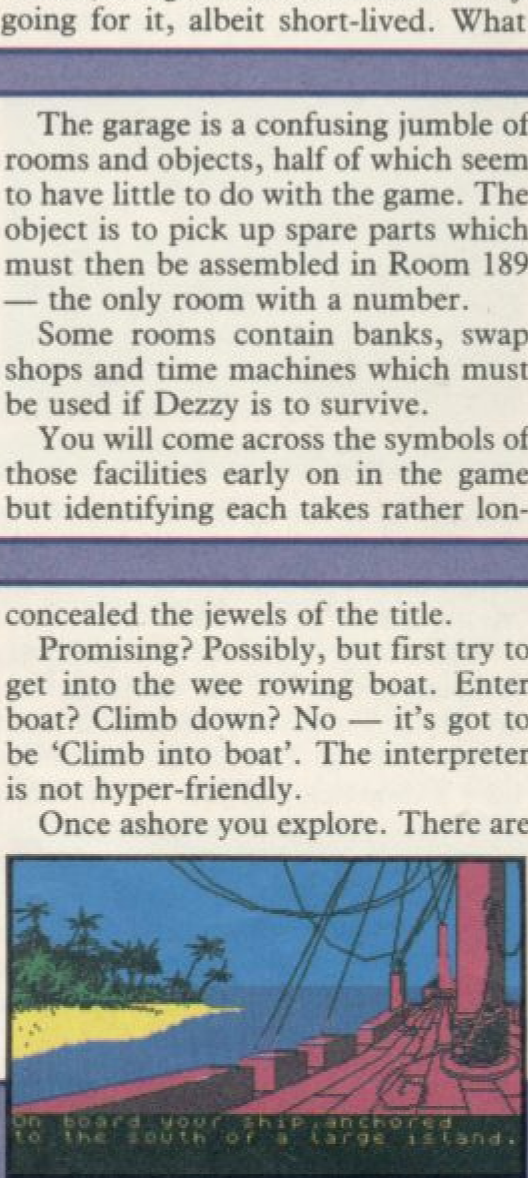
Jewels of Babylon

WOW, you think, as soon as you've loaded **Jewels of Babylon**, what faberooney graphics! Don't get overexcited though — there aren't that many.

The setting would do justice to *Desert Island Discs* — a remote, tropical sea-girt spot with dunes and palm trees. Somewhere in the interior lie concealed the jewels of the title.

Promising? Possibly, but first try to get into the wee rowing boat. Enter boat? Climb down? No — it's got to be 'Climb into boat'. The interpreter is not hyper-friendly.

Once ashore you explore. There are a few objects littered about but it is possible to wander around like a total wally for endless stretches.



Endless perserverance may well get you somewhere but personally I play games to be entertained.

Richard Pirce

JEWELS of BABYLON
Interceptor
Memory: **48K**
Prices: **£5.50**
Gilbert Factor:**4**

more software on page 26

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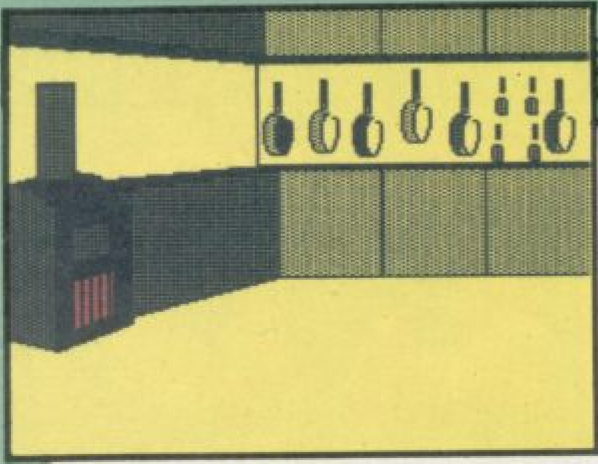
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The Illustrator

THE revolution in DIY adventuring begun by **The Quill** continues. Now you can add the icing to the cake and use **The Illustrator** to create location graphics which will give extra atmosphere and polish to your games.

This new utility program is specifically designed to be used in conjunction with **The Quill**.

Once the main menu appears your first task is to load the adventure database you have created on **The Quill.** Doing this initialises the drawing program and gives it the necessary information about the number of possible locations required.

If you have a previously prepared or unfinished graphics file those too are loaded. Again, a demo set is provided. Selecting graphics mode on the main menu then allows you to get down to the serious business of art. You can print the current pictures to the screen or amend them — this instruction is also used to start from scratch.

You're off. Two cursors are shown: the base cursor indicates where your current line is to be drawn from and the 'rubber cursor' can be easily moved around the screen to show the end point of the line.

The cursors are controlled by eight conveniently placed keys. Other single key instructions allow you to move the cursors to new points for separate bits of the drawing. Using this programming mode you can reduce a complex picture to a short series of key presses.

As with **The Quill** you will need to work carefully through the manual before you begin but there is a step-by-step demonstration which will convince you the program is highly user-friendly. All the processes demand no knowledge of programming — you will only need to be logical in your approach.

When you have finsished all you need to do is save your database and graphics files. After that you can simply LOAD " " and auto-run your graphic adventure. *Richard Price*

THE ILLUSTRATOR
Gilsoft
Memory: **48K**
Price: **£14.95**
Gilbert Factor: **9**

Brian Bloodaxe

RIGHT from the opening screens of **Brian Bloodaxe**, which simulate your Spectrum failing to load the program, you know you are entering the upper atmosphere of lunacy.

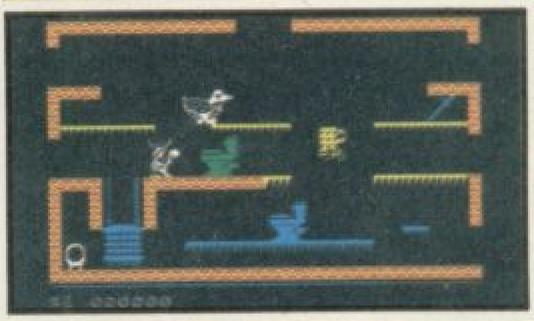
Brian is a viking, who has been frozen for centuries in a block of ice. On thawing, he decides to conquer the British, who live in 100 screens of **Jet Set Willy**-style arcade action.

Objects are scattered liberally about the screens, and you will need to engage in some pretty dubious imaginative thought to work out their purposes. Monsters range from ducks to Daleks, Mad Scotsmen to Turkish soldiers.

Those objects, of which you can carry three at a time, can be used to block the path of monsters or to make extra platforms. They are solid, and do not fall when dropped, and thus provide a means of leaping across blank areas of the screen. Getting the correct objects to the correct places, is, however, a daunting task.

Brian Bloodaxe is not original in concept, but the only game we have seen based on the **Jet Set Willy** theme to match that classic. It will be months before a solution is found to the quest for the Crown Jewels, and there is much incidental pleasure to be gained from the large sprite-style graphics and colourful visual humour. **Brian Bloodaxe** is a pleasant surprise in a market which has become a little turgid of late. *Chris Bourne*

BRIAN BLOODAXE
The Edge
Memory: **48K**
Price: **£7.95**
Joystick: **Kempston, Cursor, Sinclair**
Gilbert Factor: **8**



Weathermaster
Weather Station

SINCLAIR/Macmillan's latest offering in the Science Horizons series, aimed at 8-14 year olds, is a first rate simulation of weather forecasting.

In **Weathermaster** you are presented with a map of the British Isles. Pressure systems move across the map changing at half-hourly intervals. You are then asked to provide a weather forecast for one of the regions, usually about two days in advance.

When your forecast time arrives the computer shows how accurate you were.

The main object of **Weathermaster** is to become so accurate in your forecasting that you win all the regions of the country, no mean feat as central to the acquisition of skills in this field is the realisation that weather systems change at an unpredictable rate.

Those who are interested in weather projects would find Arnold Wheaton's



Weather Station a useful tool for recording data. It is a dedicated database which allows you to enter data on a daily basis for up to a year.

The main strength of the program lies in its search facilities which allow detailed analysis of the data, over two fields if necessary, as well as over bands of data. *Theo Wood*

WEATHERMASTER
Sinclair/Macmillan
Memory: **48K**
Price: **£7.95**
Gilbert Factor: **8**

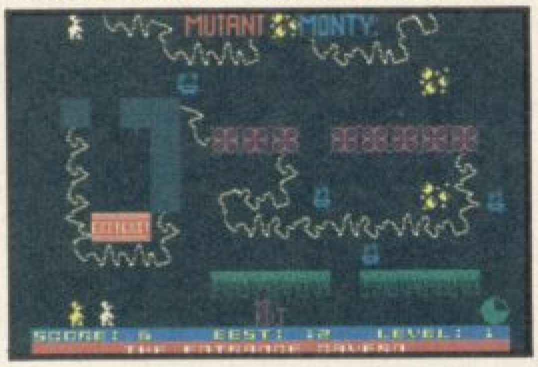
WEATHER STATION
Arnold Wheaton Software
Memory: **48K**
Price: **£9.95**
Gilbert Factor: **8**

Mutant Monty

ARTIC'S latest, **Mutant Monty**, bears a deliberately close resemblance to **Manic Miner** — a game which programmers have reproduced in almost every conceivable style and format.

The idea is to help Monty to reach the beautiful maiden, crossing the Pit of Eternal Slime and dodging innumerable aliens, sour lemons and other hostile objects, all the while scooping up piles of gold. Each screen has one exit to the next level, but all the gold has to be collected before he will be let through.

Monty moves very quickly on the horizontal levels but tends to rise and sink slowly in comparison, as if he



were indeed swimming through slime.

Thankfully there is an on/off key for the music; the Spectrum version of the first few bars of the *The Sting* is played continuously throughout.

Completely unoriginal in concept the game is at least intriguing and frustrating to play — exactly the attributes its programmers planned.

Clare Edgeley

MUTANT MONTY
Artic Computing
Memory: **48K**
Price: **£6.95**
Joystick: **Sinclair, Cursor**
Gilbert Factor: **7**

Bazam

SOMEWHERE out there in the flatlands of video, ghostly tanks still crawl about their perpetual battlezone. **Bazam** by Alan Firminger has been launched to prove it.

In the wilderness of outline graphics, tank games have always reigned supreme. For **Bazam**, Firminger has stripped away all but the bare essentials of the game. A blue background represents the playing area, and the obstacles are all shaped like cones. A radar display shows the position of the enemy, and information on the type of tank opposing you is also displayed. Joystick controls are scorned.

Because **Bazam** is such a simple version of the game, it does have the advantage of speed. Most Spectrum tank games suffer from incredibly slow moving weaponry, trundling about the screen like some iron-clad monstrosity from the trenches of the Somme. At least in **Bazam** it only takes a few seconds to find your target.

Written, surprisingly, for the now almost defunct 16K Spectrum, **Bazam** is a genuine genetic throwback to an earlier age of arcade games. If you are into nostalgia, wear your best mindless arcade zombie grin and have yourself a ball.

Chris Bourne

BAZAM
Alan Firminger
Memory: **16K**
Price: **£4.95**
Gilbert Factor: **5**

Ziggurat

NOW here's an odd one. Is **Ziggurat** an adventure or some other sort of hybrid game? Ziggurats were the multi-storey temple towers of the ancient Middle East and the game is clearly set in some such structure, although it has modern lifts and other artefacts in it.

Reading the insert won't tell you anything at all but it soon becomes clear that the aim is to escape unscathed from this labyrinth with as many precious objects as possible.

There is a vast number of rooms, each depicted in graphics but all looking pretty similar, except for the occasional special place.

Text is entered in verb/noun combinations and the interpreter is friendly enough.

It is not a highly verbal adventure and cannot possibly compare with more expensive productions. Despite that it becomes gripping purely because you want to get out of the maze and back into the light. Maybe it appeals to the reviewer's claustrophobic tendencies.

Richard Price

ZIGGURAT
Software Supersavers
Memory: **48K**
Price: **£2.99**
Gilbert Factor: **5**

Software Star

THREE years ago Kevin Toms designed the classic **Football Manager**. Not one to rest on his laurels, he has now released **Software Star**, a simulation of running a successful software publishers.

Your task is to make a pre-tax profit of £10,000 and achieve superstar status by consistently getting your games to the top of the charts.

You must make a number of monthly decisions — six, actually — which affect productivity, sales strategy and public relations, as well as launching new titles, deleting old ones and booking advertising space. Then you sit back and watch your games climb slowly up the Top 20. Any resemblance between this simulation and real life is completely coincidental. You are permitted to develop and launch only one game at a time, and there is no provision for budget software or megagames.

Adverts appear to affect sales in the month that they are placed, and you cannot advertise software before it has been released!

On launching a product you are informed that the reviews have been 'appalling', 'excellent', etc; another great opportunity to lampoon the Gilbert Factor wasted! The one faint-hearted attempt at satire is the sly digs at other software houses — Perth Hut, Sigh On and Last Games. Ho ho.

Distributors, retailers and pirates — all are conspicuous by their absence. You might as well be running a whelk stall.

If the Toms believes that **Software Star** is an accurate portrayal of life in the cut-throat games industry then Addictive Games might as well shut up shop now.

Bill Scolding

SOFTWARE STAR
Addictive Games
Memory: **48K**
Price: **£6.95**
Gilbert Factor: **3**

more software on page 30



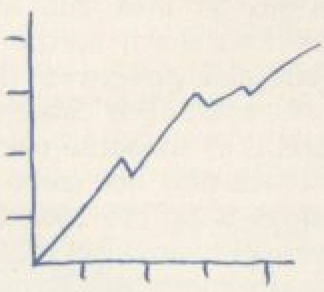
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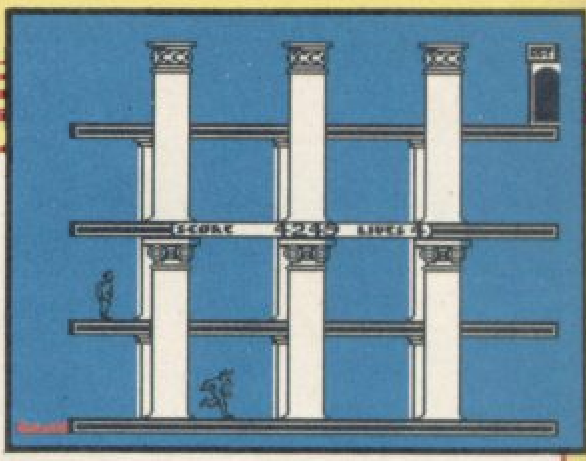
Hellfire

IT IS surprising that nobody thought of producing a game based upon the trials of Ulysses a long time ago.

Hellfire takes you from the hills at the entrance of a sacred temple, past the minotaurs which guard its inner sanctum and through a complex adventure maze where you are continually hounded and your only weapon is a mace.

The game involves three distinct tasks each of which leads into the next. On the first level you must jump onto hills, avoiding boulders and the stony stare of Medusa. Once inside the temple you must use the trampoline to move nearer the top of the screen and dodge in between the pillars to avoid the minotaurs. Each pillar will transport you to a different level of the screen until you get the sequence correct and enter the door at the top of the temple into the labyrinth where the fireball thrower and the reptilian assassin await your arrival with glee.

The small degree of skill needed to complete the first level is sure to turn players off fairly quickly. If the early levels had been more difficult to complete its graphics and plot would have made it a candidate for a number one spot in the charts.



John Gilbert

HELLFIRE
Melbourne House
Price: **£6.95**
Joystick: **Kempston, Sinclair**
Gilbert Factor: **7**

Xavior

STRANDS of DNA are firmly connected in most people's minds with biology lessons, yet PSS has succeeded in basing **Xavior** on those tiny gene carriers.

Xavior, the last surviving member of his race, must find and collect all the strands of DNA which carry the make-up of his people from a subterranean storage complex. Only when that is done can he ensure the perpetuation of his race.

The game starts at the entrance to the cavern; Xavior enters and at once sees a shimmering blue orb in a corner of the room. He picks it up knowing that this will de-energise the doors to each room in the complex. However, the orb has only enough power to neutralise four doors, and though others can be collected en route it is wise to pick them up only when needed.

Your task is enormous — hidden in over four thousand rooms are a small number of DNA strands guarded by apparitions formed from pure energy. You have just enough time to run through each room before they materailise, but should you stop to pick up an orb or piece of DNA then they will do their best to neutralise you.

Xavior is the kind of game which leaves you panting in frustration, convinced that it is impossible to find all the strands of DNA and thus complete the game. The instructions state that the player must find the secrets to the orbs — an impossible task if, indeed, any secrets exist.

However, for those that like bashing their heads against a brick wall — this is the game for you.

Clare Edgeley

XAVIOR
PSS Software
Memory: **48K**
Price: **£5.95**
Joystick: **Kempston**
Gilbert Factor: **5**

Therbo

AN alternative to war is what Arcade Software calls its game **Therbo**. Picking your teeth is equally non-violent, but only marginally less boring.

You manoeuvre a jet-propelled rugby ball along a corridor while the computer attempts to force the blazing bladder into the touchlines.

In the first stage you must shoot up 'shapes that move across the screen' as the cassette insert puts it, running rapidly out of invention but scoring points for honesty. In the second stage you get to try for goal.

The action is limited to scrolling back and forth in the middle third of the screen. Even on the 'expert' level it is possible to sit back while the computer happily allows the Therbo to wobble into its goalmouth.

'A cross between American Football and World War III' says the press release. That sounds like something worth avoiding as well. *Chris Bourne*

THERBO
Arcade Software
Memory: **48K**
Price: **£5.50**
Joystick: **Kempston, Protek**
Gilbert Factor: **3**

Wizard's Warriors

ALTHOUGH the blurb on the cassette insert trills enthusiastically about tyrannical wizards, stench of death, lethal minions etc, **Wizard's Warriors** by Mastertronic is a straightforward two-dimensional maze game.

Your on-screen alter ego is a small figure armed with a laser rifle. The purpose is to move him around the grid despatching the wizard's guards who are also supplied with lasers.

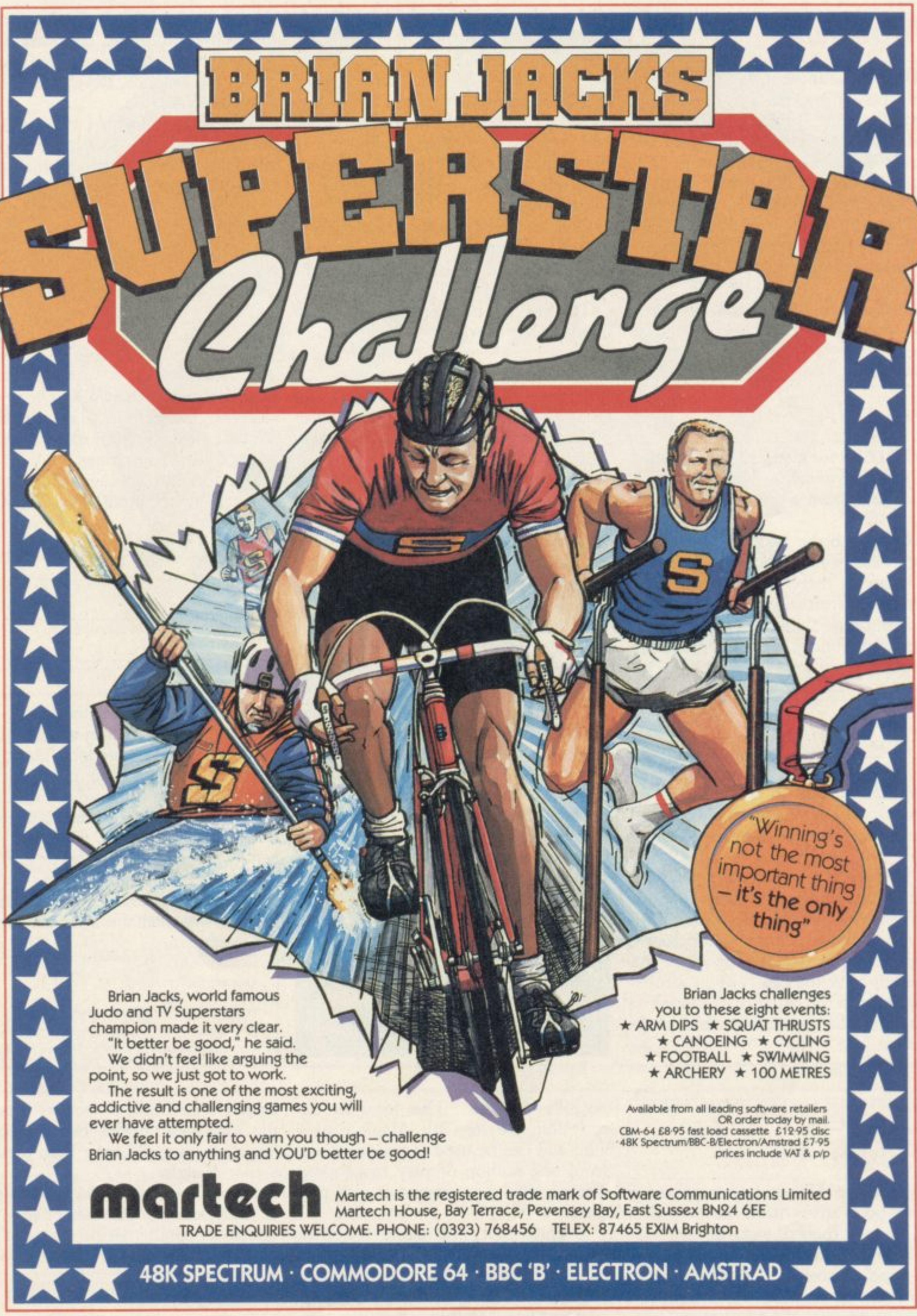
When you've got rid of the visible enemies others arrive who can only be seen in direct lines of sight. The rest of the time they can be tracked on the rudimentary radar beneath the playing area. When those are all reduced to atoms an eagle must be slaughtered, then the wizard. Difficulty increases from screen to screen.

The game is an average shoot-'em-up with no great distinguishing characteristics from many others. Graphics are pleasantly coloured but jerky. You won't need a great deal of strategic skill as the easiest thing to do is hang around with your back to a wall and wait for the rather unintelligent guards to stumble your way.

Richard Price

WIZARD'S WARRIORS
Mastertronic
Memory: **48K**
Price: **£1.99**
Joystick:**AGF, Kempston.**
Gilbert Factor: **3**

more software on page 32


BRIAN JACKS
SUPERSTAR
Challenge
"Winning's not the most important thing – it's the only thing"
Brian Jacks, world famous Judo and TV Superstars champion made it very clear.
"It better be good," he said.
We didn't feel like arguing the point, so we just got to work.
The result is one of the most exciting, addictive and challenging games you will ever have attempted.
We feel it only fair to warn you though – challenge Brian Jacks to anything and YOU'D better be good!
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48K SPECTRUM · COMMODORE 64 · BBC 'B' · ELECTRON · AMSTRAD

Blue Max

BLUE MAX, another dubious import from the United States, bears little resemblance to the real dogfights and bi-plane bombing missions of the First World War. You take your light aircraft up from a base which looks as if it is situated within enemy territory. The landing strips must have force fields around them as enemy attacks are sporadic and have little or no effect.

Most of the destruction wreaked upon your aircraft will occur because of your clumsiness in taking-off, landing or keeping altitude.

Rising on the airwaves is only one of your problems. You can release bombs on enemy outposts, tanks and rivercraft by pulling the joystick back and pressing the fire key, or button. If the bombs fail to drop at the correct time you will miss a scant opportunity to gain points.

One touch of realism is the refueling exercise which you should perform every time you sight a landing strip once every four or five minutes.

The bi-plane can perform 3D movements, such as wiggling its wings and casts a shadow on the landscape, but that shows buildings, tanks and shops to be flat as pancakes. Compared to **TLL,** for instance, **Blue Max** is clearly second rate.

The Commodore 64 version is impressive but the Spectrum version, although closer to the original, lacks some of its lustre. *John Gilbert*

BLUE MAX
US Gold
Memory: **48K**
Price: **£7.95**
Joystick: **Sinclair, Kemptson, AGF, Protek**
Gilbert Factor: **6**

Bristles

NO PRIZES for guessing that **Bristles** is a painting game — yes, all right it could have been a shaving game, ho ho.

Right, grab the stick and guide the little housepainter round the house. Do it fast — there's a very tight time limit. Be careful because there are dumb buckets, flying half pints, steam pipes and sundry other aggravating hindrances. There's also Brenda the Brat who sticks her nasty little mitts on your nice new paint and loses your score.

The house is shown in cutaway on screen with time indicators below. You use ladders and lifts to reach the various floors and the various nuisances will knock you back to the basement or deprive you of a brush if you collide with them.

Although there is nothing new about the scenario, the game is certainly ultra-fast and demanding on your reflexes. There are eight buildings with six skill levels for each, making a total of 48 permutations.

If you're into this sort of thing then sit back, switch your brain off and get sploshing. *Richard Price*

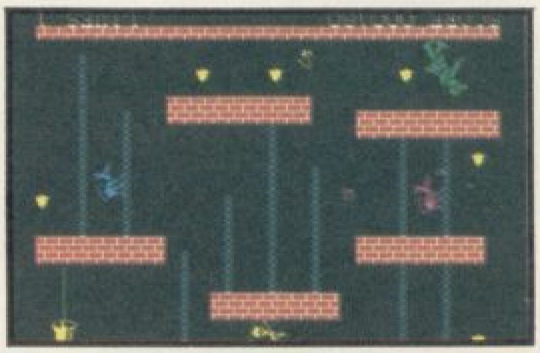
BRISTLES
Statesoft
Memory: **48K**
Price: **£7.95**
Joystick: **Sinclair, Kempston, Protek.**
Gilbert Factor: **6**

Hunchback II

QUASIMODO has returned to the computer screen in **Hunchback II** from Ocean to rescue the beautiful Esmerelda who is imprisoned in a tower.

The game is set in arcade style, with Quasimodo battling against all odds every step of the way. He has to jump and duck flying arrows, climb ropes, ring bells, leap stretches of water and generally have the agility of an acrobat coupled with the patience of a monk to overcome the insurmountable problems set him.

There are seven screens in all, each progressively more difficult — you have to collect all the bells on each screen before moving to the next level. Movement is fast, leaving no room for hesistant players. Working out the correct route can only be done by trial and error — timing is the key.



You have five lives in which to fulfil your task — no easy job. There are, however, one or two nice touches. Quasimodo can leap and change direction in mid-air — a great help when dodging cannon balls.

The game falls down on its graphics especially when compared to classics such as **Knight Lore** which shows exactly what can be squeezed out of the Spectrum. *Clare Edgeley*

HUNCHBACK II
Ocean Software
Memory: **48K**
Price: **£6.95**
Joystick: **Kempston, Protek, Sinclair**
Gilbert Factor: **5**

Curse of the Seven Faces

OH, DEAR. How many more times do us poor adventurers have to find and destroy the evil wizard?

Curse of the Seven Faces adopts the same old scenario by asking you to find the various items which comprise the average wizard's equipment.

The game is a text-only adventure. Tired story line apart, there are some positive features. The location descriptions are very full. Magic is used a lot and can be used to transport you from one section of play to another. Technically, the program is well produced.

Despite that, the game has little excitement as the puzzles are easy to solve. If you try to kill the Troll King with your small knife the screen simply tells you 'Nothing exciting happens'. Well, if I was a troll king I wouldn't take too kindly to being knifed. You begin to wonder whether the long descriptions have taken up space which could have been used for a spot of action.

All told, **Curse of the seven Faces** is disappointing but attractively produced. It could well be regarded as a beginner's adventure. *Richard Price*

CURSE OF THE SEVEN FACES
Imperial Software
Memory: **48K**
Price: **£8.95**
Gilbert Factor: **5**

THE SPECTRUM BASIC COMPILER

BLAST

YOUR BASIC

UP TO 40 x SPEED INCREASE

- **BLAST!** is the first fully compatible OPTIMISING BASIC COMPILER for the Sinclair ZX Spectrum and Spectrum +.
- **BLAST!** will compile ANY BASIC program, without alteration.
- **BLAST!** will take your BASIC programs and transform them into super-efficient code running at up to forty times the speed of BASIC.
- **BLAST!** can produce both native machine code and a compact p-code, for programs where space is at a premium.
- When you have **BLASTED** your programs you are free to distribute or sell the results without any restriction.

SIMPLICITY ITSELF

Using **BLAST!** couldn't be simpler. Just load it with your BASIC program and press "C" to compile. In a few seconds the compiled program is ready. Just type RUN and see your software run up to forty times faster.

OPTIMISATION

BLAST! doesn't just compile your programs; it also applies a range of sophisticated optimisation techniques to enhance the performance of the compiled code.
Any program can be compiled without alteration, but we think you will enjoy the wide range of extensions to BASIC built into **BLAST!**
BLAST! features genuine integer variables, debugging facilities, program protection, and much more. It will operate in resident mode, or with tape or microdive.

TOOLKIT INCLUDED

BLAST! provides the complete BASIC programmer's package. As well as a sophisticated compiler **BLAST!** includes a comprehensive toolkit with a full range of features including renumber, single-step, search and replace, and block handling operations. Use it to test and develop your BASIC programs before compiling them with **BLAST!**

STOP PRESS — OXFORD PASCAL

OXFORD PASCAL is now available for the SPECTRUM as well as the C64 and the BBC 'B'. To call us for details dial 100 and ask for FREEPHONE PASCAL.

Price/availability matrix		SPECTRUM	C64	BBC 'B'
BLAST BASIC		£24.95	N/A	N/A
OXFORD PASCAL	DISK	N/A	£49.95	£49.95
	CASSETTE	£24.95	£22.95	£39.95

All prices are inclusive of VAT
Please add £2.00 for postage and packing.

Please rush me my copy of ....

My computer is SPECTRUM ☐ BBC ☐ 64 ☐ Please supply CASSETTE ☐ DISK ☐

I enclose £.......... including £2.00 p&p Please make cheques payable to OCSS Ltd.

Name: ....

Address: ....

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Postcode: ....

Telephone: ....

Oxford Computer Systems (Software) Ltd.
Hensington Road, Woodstock, Oxford OX7 1JR, England
Telephone (0993) 812700 Telex 83147 Ref. OCSL



With Quest the QL really means business
Quest's Executive series of quality peripherals and software for the Sinclair QL allows the business and serious home user to fully realise the full potential of the most exciting computer of the 80's.
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Disk Drive
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Please send me details of the Quest Executive Series
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Another leap forward
QUEST



GST Assembler
Adder Assembler

THE NEED for machine code development software has brought a glut of assemblers onto the market. Following the release of competent packages from Computer One and Metacomco, Sinclair Research and Adder Publishing have got into the act.

Sinclair has taken on the **GST Assembler,** may be as reparation for not using the Company's 68K-OS as the QL operating system. As the assembler does not have an integrated editor it has been packaged with the Metacomco full screen editor. That provides facilities for entry of any ASCII text file so you can also use it to edit Basic programs.

The package contains a clone program to make a back-up copy but it can be used to clone any programs, unlike the clone facilities on the four Psion business packages.

If you boot up the package a command screen appears with options to load just the editor or assembler or load them into memory so that they are interchangeable.

The assembler is easy to operate once you get past the manual which is minimal and not recommended for the beginner. It is pocket-sized so you can read it anywhere — which you will need to do several times if you know little about assembler notation and the ways in which such a utility works.

The differences between the two parts of the package — editor and assembler — are distinct. At the start of both you can redefine the size and shape of the text window. Cursor control keys are used in the editor but a CON is required for the assembler.

All 68000 instructions can be used with the product which contains a series of impressive utilities to make life easier for the programmer. One such utility is the INCLUDE directive which enables you to link in other source file subroutines — macros — from microdrive as if they were part of the main source code.

The package includes facilities for conditional assembly instructions, symbol table listings and spooling to printer or microdrive. It does not, however, include sufficient monitor capabilities, a failing for which it is not alone. Add to that the difficulties of getting started because of the manual and you can see that the package has more than one rough edge.

The same is true of the **Adder QL Assembler,** although more so. It has an integrated monitor to and from which you can switch quickly. It also contains a help page. The manual is easier to understand than the one from Sinclair, though it contains less information.

Adder provides most of utilities available with the Sinclair product but seems to have designed the assembler with the beginner in mind.

If you are a fairly competent programmer and understand the technical terms of the trade then you should go for the Sinclair package. For beginners the Adder package is the best bet. You could, however, buy neither as the Metacomco package is still the best on the market.

John Gilbert

GST ASSEMBLER
Sinclair Research
Price: **£39.95**
Gilbert Factor: **8**

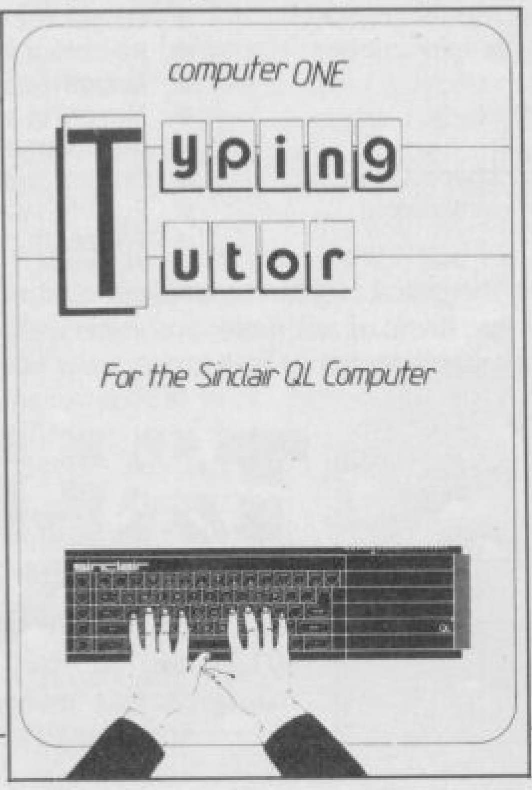
ADDER ASSEMBLER:
Adder Publishing
Price: **£34.95 inc p&p**
Gilbert Factor: **7**

Typing Tutor

TYPING Tutor is intended for people who want to start typing on the QL, with all eight fingers. The package provides an excellent piece of SuperBasic software which gives you tests of increasing complexity starting with the home positions on the keyboard and, in 10 lessons, moves through all types of letter combinations to the formation of simple sentences.

The main test display shows a schematic of a keyboard and, underneath, tells the typist which keys to press and a message which informs them whether they have pressed the correct key. If you press the wrong key the corresponding position on the schematic keyboard is circled and a warning beep is sounded, for those who have mastered the art of hearing QL sound.

At the end of each test you will be given a report on your speed, the number of errors which you have made and your accuracy, worked as a percentage. The timings given may be a little suspect as the program is written in Basic and, using the system clock, cannot give a completely accurate word per minute calculation, but the time error is not large enough to greatly alter your chances of becoming a whizz at the keyboard.



The QL keyboard is the other disadvantage in using **Typing Tutor.** The software could be treated more seriously if it was written for a machine such as the IBM PC or even the Commodore 64, but it is good fun and probably the first addictive program for the QL. **Typing Tutor** on the QL can be compared with the popular IQ and psychology tests of which schools are so fond.

If you want a bit of fun with a reasonable piece of software buy **Typing Tutor,** but if you want to test your pinkies on a keyboard get an IBM PC or, better still, a typewriter.

John Gilbert

TYPING TUTOR
Computer One
Price: **£19.95**
Gilbert Factor: **6**

Quick spinning disc

THE Computamate Q-Disk could be the definitive floppy disc interface for the QL.

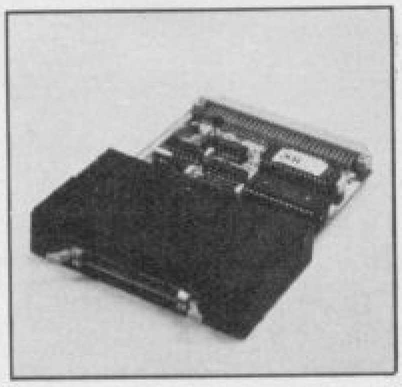
The disc drives can be used as a direct substitution for the microdrives, and that includes the PSION packages. A conversion program is provided on disc for those and they can be made to work from a single drive. The new versions of the programs can be configured for discs.

As a bonus you get a number of extras — apparently lifted from the forthcoming Sinclair **Toolkit** program — in the form of true random access, enhanced file handling, Basic control of jobs — provided you can get back into Basic — and Hex and Bin conversion routines. CST must have pointed its prayer mat towards Fetter Lane as the Q-Disk will be available from W H Smith, priced £149 inclusive. They will also be selling a number of combined drive and interface packages from £299 up to £574.

Fitting the interface is easy. The cover on the expansion port is removed and the interface slides in.

Up to two drives can be used, 5¼, 3½ or 3in; the software in the interface could handle more drives but the hardware is the limiting factor. Each drive can be any combination of 40 or 80 tracks, single or double-sided. You have between 354 and 1434 sectors available per drive, depending on the type of drive, or 177K to 717K bytes free, a hefty 1.5Mb possible with two drives. Compared to the 100K of the microdrives, and despite the recent price reduction of the cartridges, that is a more cost effective method of storage.

At its lowest level you can use the interface to replace the microdrive, replacing MDV1_ with FLP1_ and so on. All the usual load and save commands are available for programs and code and EXEC and EXEC_W have been redefined for the drives. The disc is about



four times faster in loading and saving code but, due to the way QDOS is designed, only twice as fast saving Basic and takes almost as long as the microdrives to load it.

Where Q-Disk scores is in its file handling. You can use the normal open and close commands, but those have the nasty habit of stopping a program running and generating an error. To overcome that you now have five new commands for opening files which, when used, return the error code in a variable. You can have a program line which says IF err=7 THEN etc.

The other disc-specific commands allow you to rename a file, truncate it, use a wild-card when obtaining a directory or deleting files and set default devices. There are four other commands, not detailed in the manual for obvious reasons which allow you direct access to individual tracks.

If you have no faith in microdrives and need the reliability of discs then go and buy one. If not, then you could do worse than to buy one anway.

The Computamate Q-Disk is available from the larger branches of W H Smith.

The parallel printerface

IF YOU have a Centronics Printer and a QL you have two options, either to spend up to £70 on converting your printer or spending only £49.95 on buying the RS232/Centronics converter from Technology Research.

While other converters have appeared, some at a lower price, this has the advantage that it should be available in high street stores soon. As with other converters, one end plugs into the SER1 socket of the QL and the other, through the obligatory little black box, connects to the printer. The overall length from plug to plug is nearly three metres. It is preset to the QL default settings, 9600 baud etc., and so it can be plugged in and ignored.

Further details from Technology Research Ltd, Unit 18, Central Trading Estate, Staines, Middlesex TW18 4XE. Tel: 01-816 3547.

Double vision endorsed

MBS Data Efficiency has the distinction of being the first hardware company to have its product officially endorsed by Sinclair. The product in question being a 12in monitor called the Vision QL.

The monitor is made by Kaga in Japan and so is full of state-of-the-Japanese-art technology. That includes 'a 90 degree deflection tube', 'Linear Amplifieres' and 'an X-ray protection circuit'.

Why Sinclair should back this particular monitor is a bit of a mystery. It has a smaller picture than the usual 14in monitors and the picture, while adequate, is not outstanding. Trying to cram 85 characters onto that screen size means you have to be closer than usual and turn the brightness up to distinguish the characters; even then they tend to blur. The monitor we were sent for review, which you would expect to be correctly set up, had the added disadvantage of having spare screen around the picture.

Unlike other monitors, however, the Vision QL has a good array of controls on the back to adjust picture



size and position so you can get the most from it. On the front is a brightness control and the on/off switch.

It is supplied with the RGB lead already attached and so is, initially, easy to set up. Also it has a black housing and so complements the overall QL style.

If it was not for the Sinclair seal of approval this monitor would not stand out from the rest. Its price of £299 inc seems to be about the average. As it is, and bearing in mind the wide service base of MBS, you can expect to see a lot of them.

MBS Data Efficiency Ltd, Maxted Road, Maylands Avenue, Hemel Hempstead, Hertfordshire.

A wealth of Peripherals for your Spectrum!

By RICK BRAVO

Since the 48K Spectrum was launched the opportunities it offered has attracted peripheral manufacturers throughout the world.

One of these manufacturers was bound to emerge as the ''brand leader'' and in the case of the Spectrum this turned out to be DK'tronics. The company is based in Saffron Walden in Essex and proudly boasts a history dating back to the ZX80. All the company's products are manufactured in England at their own factory and they have now established themselves as world leaders, exporting to over 30 countries.

Below you will find a review of their range which now includes over 16 products, all of which are available for the Spectrum and Spectrum + models.

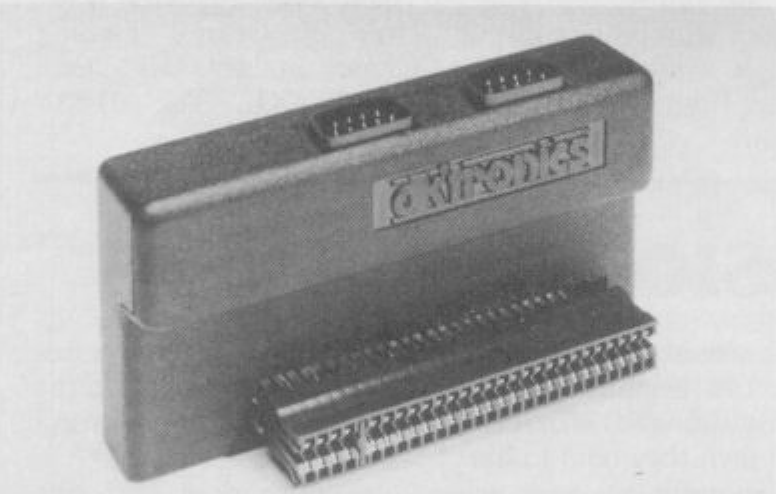
Keyboard



The DK Microdrive Compatible Keyboard is the best selling keyboard in the world and is now used by around 10% of all U.K. Spectrum owners. It is microdrive compatible and offers more key functions than any other keyboard in its price range. The stepped keys and space bar make it even easier to use. It is constructed from high density black ABS and has 52 keys and a full width space bar. A separate numeric keypad of 12 red keys including single entry 'delete' plus single entry 'decimal point' facilitate fast numeric data entry.

From good computer shops everywhere at only £37.50 or direct from DK'tronics, add £1.50 post & packing.

Dual Port



The first port simulates 6,7,8,9, & 0 Keys. The second port simulates in (31) command.

The port will accept any Atari style joystick.

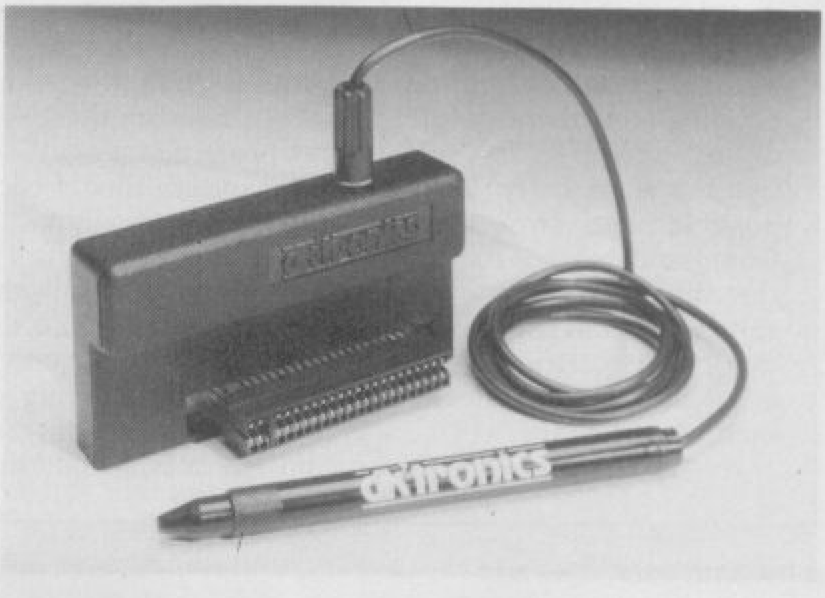
It will run any software. That is:-

(a) Using Keys 6,7,8,9 & 0.
(b) Having redefinable key instructions.
(c) Using in (31) (i.e. Kempston).

This Dual Port interface interconnects with the existing range of DK'tronics products to form the most comprehensive range of Spectrum peripherals available from any manufacturer.

From good computer shops everywhere at only £13.00 or direct from DK'tronics, add £1.50 post & packing.

Light Pen



This highly successful Light Pen for the Sinclair Spectrum plugs neatly onto the rear of the Computer or the rear of the printer connector. The operating software now runs faster and supports 16 pre-defined instructions. You can change all the colours (Border, Paper, Ink), draw circles, arcs, boxes, lines and insert text onto the screen (ideal for diagrams etc.) Save & load completed or partly completed screens onto or from the tape.

There are also features to draw Free Hand and animate on the 48K Spectrum, you can retain and animate 5 screens.

You can also use the machine code on its own in your own programs for selecting out of a menu, playing games etc. All entry points necessary are given. The Pen works down to pixel level with pixel accuracy.

From good computer shops everywhere at only £19.95 or direct from DK'tronics, add £1.50 post & packing.

From dk'tronics® Saffron Walden, Essex CB11 3AQ tel:(0799)26350

3 Channel Sound Synthesizer

Any microcomputer is capable of manufacturing sound, however, in order to produce a single octave 'C' note with a frequency of 8372Hz the signal needs attention over 16,000 times per second.

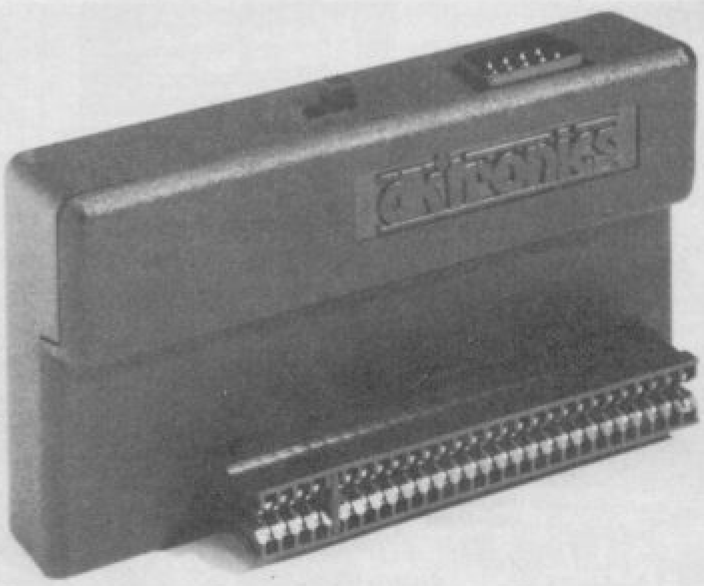
To produce software capable of perfoming just this one task would be difficult if not impossible, especially when you consider that to produce arcade type sound effects requires even greater attention.

The production of these sound effects without the constant attention of the processor is now possible thanks to the AY Sound Chip, its flexibility makes it essential for a wide range of applications including music synthesis and sound effects generation, continuing the monitoring and production of sound after the initial command.

More often than not realistic sounds require more than one effect and this function is provided by 3 independently controlled channels, as an example compare the sound produced by the single note of 'C'with that produced by the chord 'C' and you will know just what I mean, likewise producing the sound of an explosion using all 3 channels gives games a totally new dimension.

Add to this the ability to alter the pitch tone and shape of the sound you have produced and it's flexibility is unlimited. In simple terms, imagine the note you have produced as a calm sea, by altering the pitch and shape you can produce waves, the top of the wave corresponds with the maximum volume and pitch of the note, which like the wave itself rises and falls.

Programmable



At last! A fully programmable joystick interface with feed through connector that really works!

Now you can run ANY software from ANY supplier with the DK'tronics fully programmable joystick interface. It comes complete with machine code software and can be programmed in seconds to give full 8 directional joystick movements plus five capabilities and will accept any Atari/Quickshot type joystick. A catalogue is now available showing the full range of products available from DK'tronics the world's leading Spectrum peripheral manufacturer. The through connector enables other addons to be plugged into the rear.

From good computer shops everywhere at only £22.95 or direct from DK'tronics, add £1.50 post & packing.



Speech Synthesizer

The speech synthesizer uses the popular SL0/256 speech chip and has an almost infinite vocabulary. It is supplied with a text to speech converter for ease of speech output creation. Everything you wish to be spoken is entered in normal English, without special control codes or characters, it is therefore extremely easy to use. The voicing of the words is completely user transparent and the computer can carry on its normal running of a program while the speech chip is talking.

Although there are only 26 letters in the alphabet, letters have a totally different sound when used in different words. For example, the "a" in Hay is much longer and softer than in Hat. When you speak you automatically make adjustments because you know just how a word should sound. Not quite so easy with a computer. After looking at other speech synthesizers we decided that it was essential that the DK'tronics Spectrum Speech would offer a simple system that would enable the user to produce realistic speech that was instantly recognisable.

The solution to the problem was extremely complicated, it required hours of programming to enable the computer to look at the individual letters that make up each word and compare their relative position to each other before deciding on the appropriate sound.

I consider this to be the best Spectrum Speech Synthesizer on the market. From good computer shops everywhere at only £24.95 or direct from DK'tronics, add £1.50 post & packing.

Centronics

The new Dk'tronics Parallel Centronics Interface will link your Spectrum to any printer with a standard centronics input. As the choice is vast, you can select the printer exactly suited to your needs.

Features of the interface include: Runs all parrallel centronics type printers: Controlling software fully relocatable; Interfaces with any software using the printer channel e.g. Tasword Dev Pack etc; LList Lprint recognised. High res screen dumps; All control codes allowed through to printer; Fully microdrive compatible.

Supplied with full instructions and controlling software. From good computer shops everywhere and sensibly priced at only £39.95 or direct from DK'tronics, add £1.50 post & packing.

...LET US BROADEN YOUR HORIZONS

SPECTRUM

Digital Sound Sampling Technology. NOW Available on your Spectrum



Complete unit and Software Package

£49.99 POST FREE

• Digital Sound Sampling has only previously been available for large micros and costing at least 10 times the amount. • The Sound Sampler allows you to record 'Digitally' any sound into memory and instantly replay it at any pitch, forwards, backwards, ascending scale, compressed, expanded, with echo, endlessly looped etc. • Supplied complete with Software package to facilitate the above operations, plus on screen 'Voice Prints' + Frequency Plotting. • With on screen keyboard + drum kit a whole symphony could be produced from a single Sample Sound. • This is a professional unit featuring 8 Bit D to ADC converters as used in Digital equipment now sweeping the music world. • Although the unit is not a toy, giving truly astounding results for the musically inclined, we have incorporated a games interface to allow you to use Sound Sampling in your own games etc., so the Sound Sampler would be of interest to everyone.

SPECTRUM

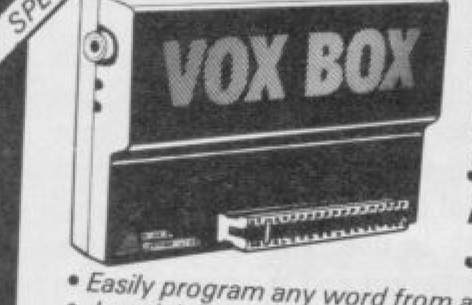
NOW! You can connect your Spectrum to a full sized printer...



ONLY **£34.99** POST FREE

• The Datel Interprinter is a Centronics Interface which allows the Spectrum to be connected to a whole range of full sized printers.
• Comes complete with connecting cables and 36 way plug to fit most printers including Epsons, Seikoshas, Star, Tandy, Shinwa etc.
• Complete with software to generate text copys plus additional software to facilitate hires screen dumps.
• The Interprinter plugs straight into the expansion port. • **Available Now!**

SPECTRUM



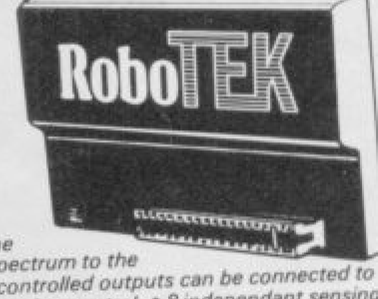
ONLY **£34.99** POST FREE

THE ULTIMATE SPEECH SYNTHESIZER Plus built in Joystick Interface

• Easily program any word from a unlimited vocabulary.
• Joystick Interface accepts any standard type (Kempston compatible) including Rapid Fire.
• Also boosts Spectrums sound through your TV.
• All in one unit, no messy wires. • **Available Now!**

SPECTRUM

NOW! ROBOTICS + MODEL CONTROL MADE EASY FOR YOUR SPECTRUM



ONLY **£29.99** COMPLETE POST FREE

• The Datel Robotek is an all in one controller which connects your Spectrum to the outside world. • 4 independantly controlled outputs can be connected to robots, models etc. to give full direction control. • 8 independant sensing channels give constant "feedback" to your micro making possible "artificial intelligence" and the ability to adjust to its environment. • Programming is very easy using only a few basic commands. • Other applications including sophisticated security and domestic uses are endless. • Supplied complete with connecting cables & full instructions. • **Available Now!**

SPECTRUM

Now you can create Superb Graphics easily with the New Lightwriter



ONLY **£16.99** POST FREE

Lightpen comes complete with Interface & Software

• Just plug in the Datel Lightwriter and draw circles, squares, rectangles, make superb hand drawings, paint, fill, erase, choose inks, paper, colours. • Save your results into memory (48K) and use in animation or save onto tape to use in your own games. • All functions selected from screen menu with the lightpen.
• Unbeatable value. • Nothing more to buy.

SEND NOW AVAILABLE FOR IMMEDIATE DELIVERY

SPECTRUM

NEW ALL SYSTEMS GO!! SWITCHABLE JOYSTICK INTERFACE



With built in Sound Booster for "On Screen" sound

ONLY **£22.99** POST FREE

UNBEATABLE VALUE MULTI-FEATURE UNIT!

The TURBO ACE gives maximum joystick compatability by simply switching through all systems ie, Kempston , Cursor , Interface 2.

• The all in one unit also features an Amplifier which delivers the sound from your games etc., directly through your T.V. (also gives keyboard click which helps when typing data etc.).
• These features make the TURBO ACE the number one add on for the games player.
• Accepts any 'Atari' compatible joystick.
• **Available now.**

SPECTRUM



The ultimate add on for the keen games player!

Joystick Interface Plus Spectrum Soundbooster

Actually Amplifies through your TV Speaker

ONLY **£17.99** POST FREE

FEATURES INCLUDE

• Joystick interface compatible with a huge range of games (Kempston system) • Compatible with any Atari type joystick including auto rapid fire models. • Amplifies Spectrums 'Beep' into a roar through your TV speaker! (fully controllable). • Stylish all in one unit, no messy wires. • **Available Now!**

SPECTRUM

At last, the first joystick that puts the firing button where it should have been in the first place.

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Timex disc drives arrive

THE latest in the growing number of disc systems for the Spectrum has been launched recently by Timex (Portugal) Ltd.

It offers the use of up to four drives, each of which can access up to 140K; only uses two bytes of Spectrum memory — unused ones in the system variables; has a very versatile filing system; features two, independent, RS232C ports and could, in theory, be used to run CP/M programs. It uses Hitachi 3in drives and the figures given relate to those, but 5¼ and 3½in can also be used. On paper, at least, Timex is on to a winner.

The hardware is supplied in a number of separate, stackable, units. An interface, complete with a handy reset switch, plugs in the back of the Spectrum and is connected, via a cable, to the controller at the base of the stack. Onto that are placed the drives, and on top goes the mains power supply. Although the controller can handle four drives the power supply can only handle two, and so with a full complement of drives you will need two power supplies.

When formatted each disc has 160K of space per side and as the drives are single-sided the disc has to be turned over to access the other side. Of that 160K, 16K is taken up by the operating system and a further 4K by the directory leaving just 140K. On power up the operating system is transferred to memory in the controller leaving the Spectrum memory free.

One of the features rarely mentioned in these pages is the manual which accompanies most items of hardware. Some are good and some are not so good. The Timex manual is very bad.

The writer assumes a great deal of background knowledge about the system and therefore tells you what keys to press but not why you are pressing them.

To use the system all the normal load, save and merge commands are used, in the usual manner, including MERGE not auto-running.



The microdrive keywords are also used so CAT * will display the current directory; current in that you can have eight levels and up to 15 directories. Similar files can be kept in separate directories and directories can be kept in other directories.

The whole thing is arranged in the form of a tree. At the base, or root, are the two RS232 channels and the names of all the discs in the drives. Each disc name can hold a number of different directories and files, each directory can hold further files and directories, and so on up the tree.

As can be seen the directory structure is rather complex, possibly unnecessarily so on such a small machine with limited disc space. You can use just one level of directory which may make life easier.

The filing system offers two sorts of files. Both use the microdrive OPEN # and CLOSE # with the type defined using DIM. With the first sort strings are PRINTed to the file and can then be subsequently INPUT back into strings in the same sequence. The second sort is based on a record. That is a string of fixed length, up to 256 characters, which is PRINTed to the file as before. Up to a maximum of 65535 of such records can be sent to the file.

The system is supplied with a demo disc which contains, in addition to some simple Basic programs, utilities to make back-up copies of discs, set an RS232 port to use LPRINT and LLIST, transmit and receive over the RS232 lines and dump a file to a printer in Hex.

The demo highlighted one of the problems with the system; because of the odd directory system it takes quite a time to discover how to load most of the programs. Once that is done it can be timed using the program:

```
10 for n=1 TO 30
20 SAVE *"test"+STR$ n CODE 32000,200
30 NEXT n
```

SAVEing was a little slow at 1.16 minutes while loading and erasing were slightly better than average at 19 seconds and 23 seconds respectively.

All in all, Timex has produced a good system which is capable of doing most of the things you need from a disc. All it needs to do now is produce a manual which tells you how to use it.

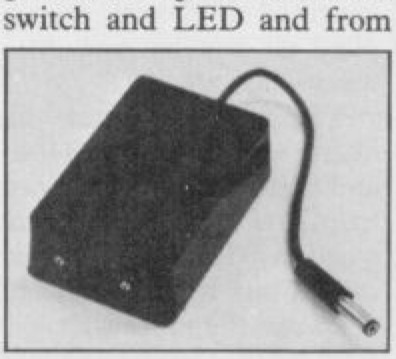
Due to its complexities the price is high — £269 inc — but, in theory, if you change computer all you would need to change would be the interface, which should be quite cheap. The ability to run CP/M may also be useful but Timex will have to supply programs converted for the system.

The 3in discs used by the system are gaining popularity with home computer users but, with the drop in microdrive cartridge price, they are expensive at £4-£5. For further information on prices of add-on drives — expected to be around £100 — and power supplies contact Micro Interface on 01-340-0310.

Colourful reset switch

FOLLOWING last month when we looked at two reset switches for the Spectrum, this month, for a change, we only looked at one. It is from Rainbow Electronics and if, like me, you are one of the — unlucky? — ones without a Spectrum Plus, and are too lazy to make your own switch, it is nicely made and a useful addition.

It consists of a little black box into which the lead from the power supply is plugged. On top is an on/off switch and LED and from the side a lead goes to the power socket of the Spectrum. While it is not a substitute for a mains on/off switch it can save a lot of wear and tear on the socket.



Details from Rainbow Electronics, Glebe House, South Leigh, Whitney, Oxfordshire OX8 6XJ. Tel: 0993-5432. The switch is priced £4.95 inc.

more hardware on page 42

Miraculous modem

THE WS2000 modem from Miracle Technology has been a popular addition for the BBC for some time. Recently, however, it has received the coveted British Telecom approval so it can now be legally connected to the telephone lines. I wonder what users did with them before.

Spectrum users are now catered for as well with the aptly named ZX Interface and software which connects the computer to the modem. Unlike the VTX5000 the WS2000 offers a complete range of transmission and reception rates so it can be used to access other modems around the world.

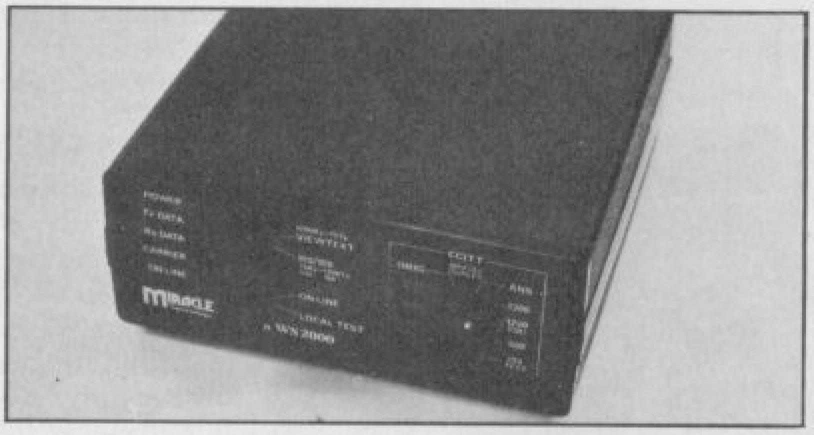
Those rates are the standard 1200/75, used to access Prestel and Micronet 800, 75/1200 so you can pretend to be your own Prestel, 1200/1200 or 600/600 half and 300/300 full duplex.

As transmission standards vary it is normally set to CCITT V21, as used in Britain. Because of the BT regulations the CCITT V23 setting should only be used off-line to test equipment and the BELL 103/113/108 and BELL 202 settings can be used only if you remove a small pin.

The WS2000 can also have auto-dial and auto-answer boards fitted but neither the ZX interface nor the software support them at the moment.

The interface plugs into the Spectrum user port and joins the modem via a cable. It has six switches on the back which are used to set the transmit and receive baud rates, which can be 75, 300 or 1200.

The software is remarkably easy to use. Once loaded from tape you are given seven options. The first is to enter your personal ID number; one of the other options is to make a back-up copy of the software and that would automatically save the ID with it. That SAVE is the one annoying feature of the software; it will only save to tape, although you can subsequently transfer it by hand to microdrive.



The other options are Viewdata mode, as used on Prestel; Teletype mode, as used on the 300/300 bulletin boards; the ability to change the transmission format from a wide selection; a frame processor and a Mailbox Editor.

Overall it is an impressive piece of software; it offers enough facilities for most applications, and could be easily used by someone with little, or no, experience. It is also remarkably short considering it contains the complete Prestel character set. The manual is helpful too, the only omission being a list of the Prestel characters.

The snag with all this is the price. The modem costs a whacking £149.44 and the ZX Interface a further £45.94. While this is possibly the only modem you will ever have to buy, considering the recent price reduction of the VTX5000, it is nevertheless too high.

If you want more information contact Miracle Technology (UK) Ltd, 10-12 St Peter Street, Ipswich IP1 1XB. Tel: 0473 51785.

Sound and television

CHEETAH Marketing has solved the problem for those of you who have trouble hearing the Spectrum BEEP. Its latest product, Mega-Sound, simply amplifies it through the TV.

All you have to do is plug the unit into the back of the Spectrum — or Plus — and a lead into the MIC socket. Turn up the volume on the TV and you can deafen the neighbours. There is a small potentiometer inside which you can adjust — they even provide a screwdriver — to tune the unit to the TV and a through port on the back for other add-ons.

Unfortunately, Mega-Sound will only work if you have an Issue 3, or later Spectrum as it uses lines which on the earlier models were not taken to the edge connector. Also it can cause a slight degradation of the display, but the Spectrum display tends to be so bad that this is barely noticable.

It is obtainable in retail shops, priced £10.95. Cheetah Marketing Ltd, 24 Ray Street, London.

Part of the furniture

TO MANY people the idea of a computer table will seem unnecessary.

The Computable from Dixonmyne is available in a number of finishes — mahogany, teak or, to order, yew, walnut or burr elm. The frame, legs and top are solid wood while the sides are veneered chipboard. As supplied all you have to do is screw the legs on.

The overall sizes are height 19in, width 34¾in and depth 19½in. For Spectrum owners a matching wooden load/save on/off switch box is also available.

In use the table is surprisingly handy. It is just the right height for you to sit in the armchair in front of the TV. All the wiring can be stored inside and when others insist that everything be put away you can just pop everything out of sight in the drawer.

The price, £105 plus £6.00 p&p, seems high but for a solid table it is reasonable. The load/save switch is an extra £12 and a mains adaptor £8.00. Longer legs can also be supplied.

Dixonmyne, Unit 51, Lower Goods Yard, Trafalgar Street, Brighton BN1 4FQ. Tel: 0273-201568.



If you're into program writing....

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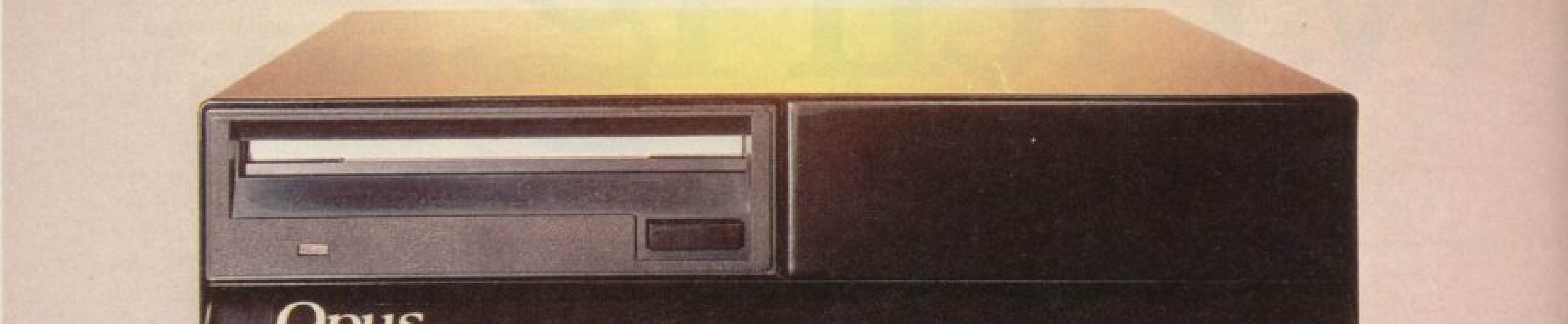
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THE DISCOVERY RANGE

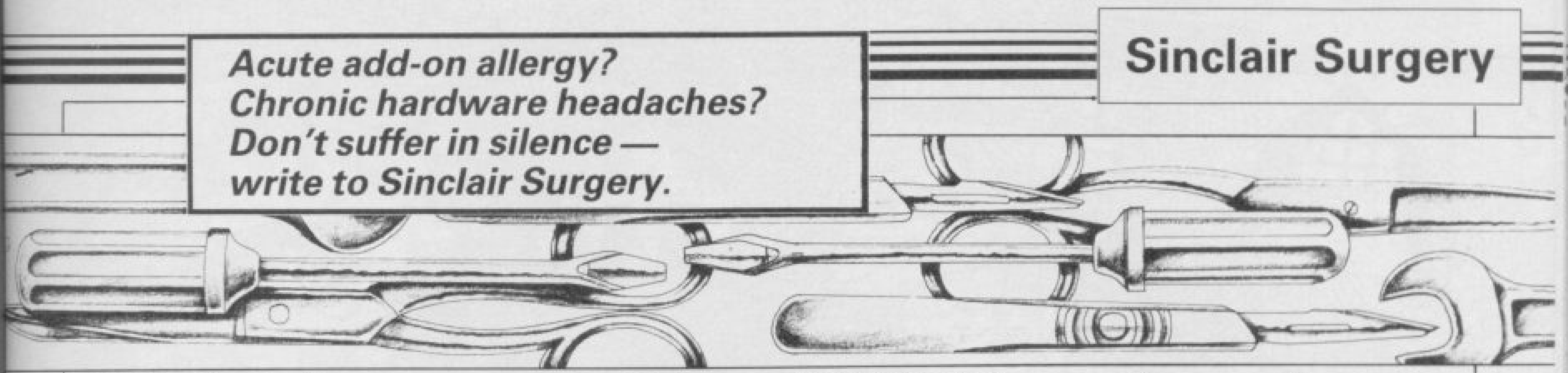
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Acute add-on allergy? Chronic hardware headaches? Don't suffer in silence — write to Sinclair Surgery.

Wafadrive compatible with most Spectrums

MY Spectrum is housed in a Fuller FDS keyboard. I recently ordered a Rotronics Wafadrive with the view to upgrading it later to a centronics printer, but found that the Wafadrive would not initialise. I kept getting the famous question mark every time I tried to enter NEW*.

Suspecting a duff Wafadrive I tried it on a friend's, only to see it burst into life and work normally.

I have been led to believe that Wafadrives, and indeed microdrives, are incompatible with early Spectrums — mine appears to be an issue two.

R C Ross, Grantham, Lincolnshire.

● *The Wafadrive should be compatible with all Spectrums, and only the very latest interface ones will not be compatible with an issue one.*

Your best bet would be to replace your Spectrum in the original keyboard and try the Wafadrive again. If it still does not work then contact Rotronics as the timing in the Spectrum may be slightly off.

If you are still unhappy with the Wafadrive, then have a look at the fast storage series — Sinclair User, issues 33-35 — and keep an eye out for new drives.

Beating the bugs in ROM

MY Spectrum Plus prints 2.3283064E−10 for 0 when I enter the following:—

```
10 LET S=1
20 FOR N=1 TO 10
30 BEEP .5,N
   (OPTIONAL)
40 PRINT S; " "
50 LET S=S−0.5
60 NEXT N
```

This is an extract from a longer listing I was compiling for a game, where 'S' was the most important value, and I was getting nowhere.

If I enter 0.5 − 0.5 I get the expected result 0.

C L Baker, Chesterfield.

● *You have found one of the famous Spectrum Bugs. The Spectrum does not realise that ½=0.5. You can get round it by adding the line*

45 IF s=1 THEN LET s=0.5: GOTO 60

For another interesting bug try PRINT INT −65536.

As the Spectrum Plus has the same ROM as the ordinary Spectrum it still has all the bugs. For further bugs read Understanding Your Spectrum *or* The Complete Spectrum ROM Disassembly *by Melbourne House.*

Alternatives for RAM upgrade

I OWN a Spectrum 16K which is now out of guarantee, and I would like to upgrade to 48K.

Can you please suggest a supplier whose product would make my computer similar in all ways to the machine currently available.

G S Sandeis, Newcastle, Staffordshire

● *The upgrade you suggest requires you to put some extra chips inside the Spectrum. Nearly all the upgrade kits from the various advertisers in* Sinclair User *use the same chips and so there is little to choose between them.*

One of the Spectrums which we use has an upgrade from East London Robotics Ltd, price £27.00 with a **Beyond Horizons** *tape. We have heard good reports of the upgrade from Fox Electronics Ltd, 35 Martham Road, Hemsby, Great Yarmouth, Norfolk, priced at £23.00.*

A change in character

I WOULD like to change my printer from 32 characters to 80 characters. Any suggestions where I could acquire this information would be appreciated.

L R Flacke Marshfield, near Cardiff

● *At best the Sinclair printer can only print up to 64 characters across. You will need to buy a full-sized printer and interface.*

Auto-fire makes happy fingers

I USE a Quickshot II joystick with the Protek switchable interface and I find that when on auto-fire, it does not fire as rapidly as when you hold down the fire button. Auto-fire appears to fire at about half the normal auto-repeat speed.

Because of this my friend tried holding down the fire button for long periods of time. After a while, the button stopped working and I don't want my joystick to go the same way.

Dales Pearce, Leeds

● *The Protek interface is not designed to use the auto-rapid fire feature. The only one we know of which does is the AGF Protocol 4 which left a little to be desired.*

A cure for eye-strain

RECENTLY there have been some advertisements about new TVs which have a monitor input plug — such as the Hitachi Prisma. Please could you advise me where I could get a lead for my Spectrum so I can use it with these TVs.

Lee Morgan, Shrewsbury, Shropshire

I have recently purchased a Spectrum but find my enjoyment spoiled by eye pain and tiredness even after minimal use.

Although I am partially sighted I have not found the same problem from small figure work in my employment or from watching TV.

I would appreciate any recommendation which could help.

P Gillett Brighton

CAN I buy a special socket for an RGB monitor?

Peter Nesarajah, Warrington, Cheshire

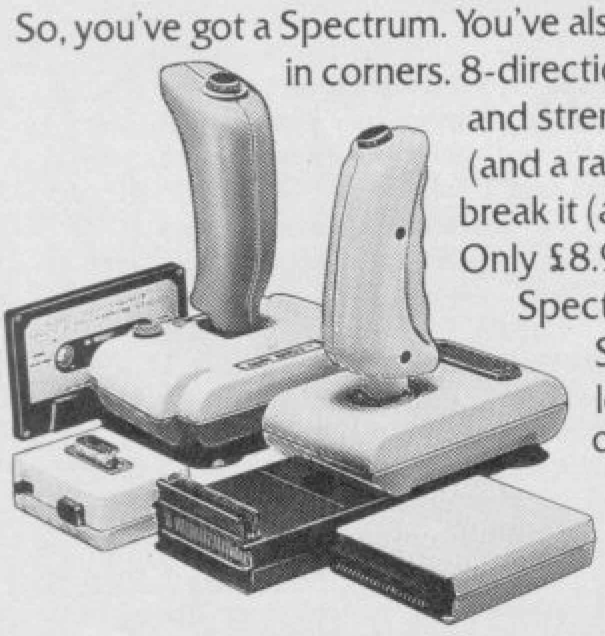
● *Ordinary TVs are not designed to be used with computers so the picture you get is far from ideal. The best answer is to use a monitor or one of the new combined TV monitors.*

A composite video monitor can be connected to the Spectrum user port — issue three onwards — but if you want to use RGB — colour — you will need an interface. The only company currently making a general RGB interface for the Spectrum is Adapt Electronics, 20 Starling Close, Buckhurst Hill, Essex IG9 5TN. Microvitec, Futures Way, Bolling Road, Bradford BD4 7TU sell a monitor with interface.



REWRITE THE HIGH SCORE TABLES

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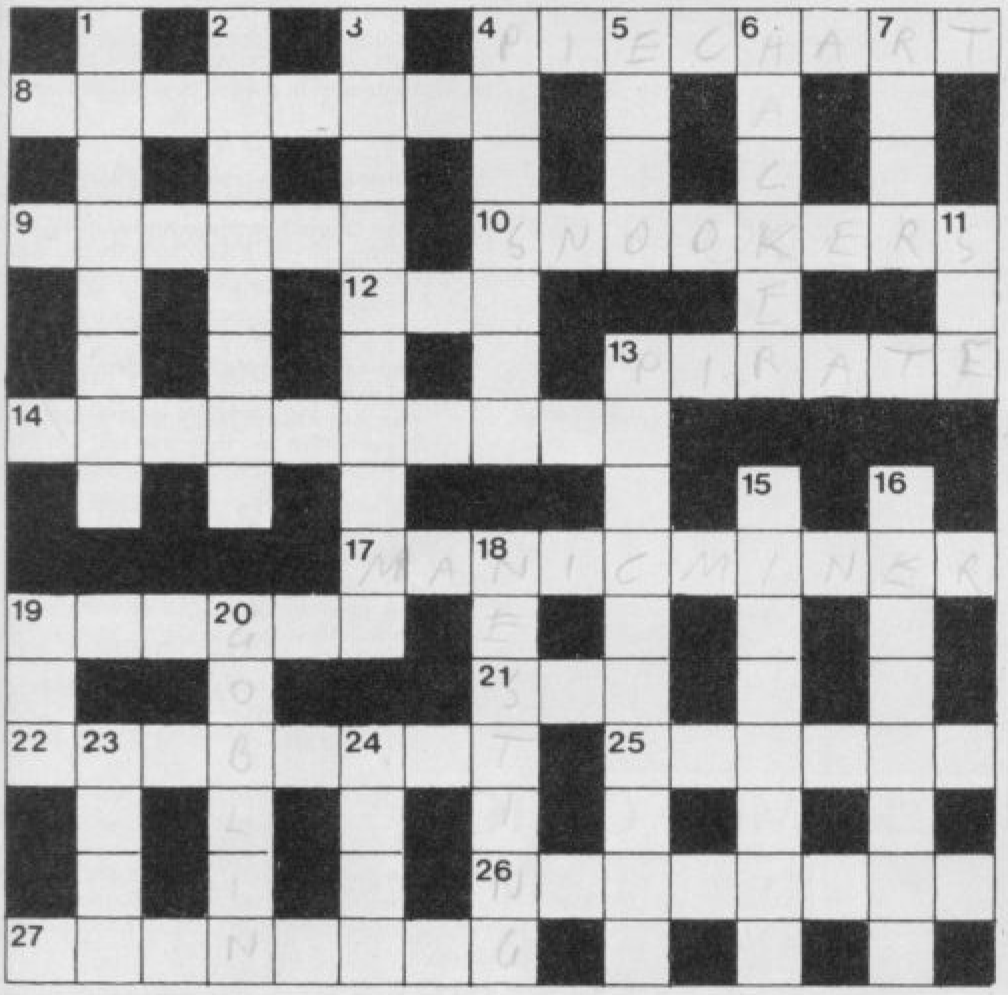
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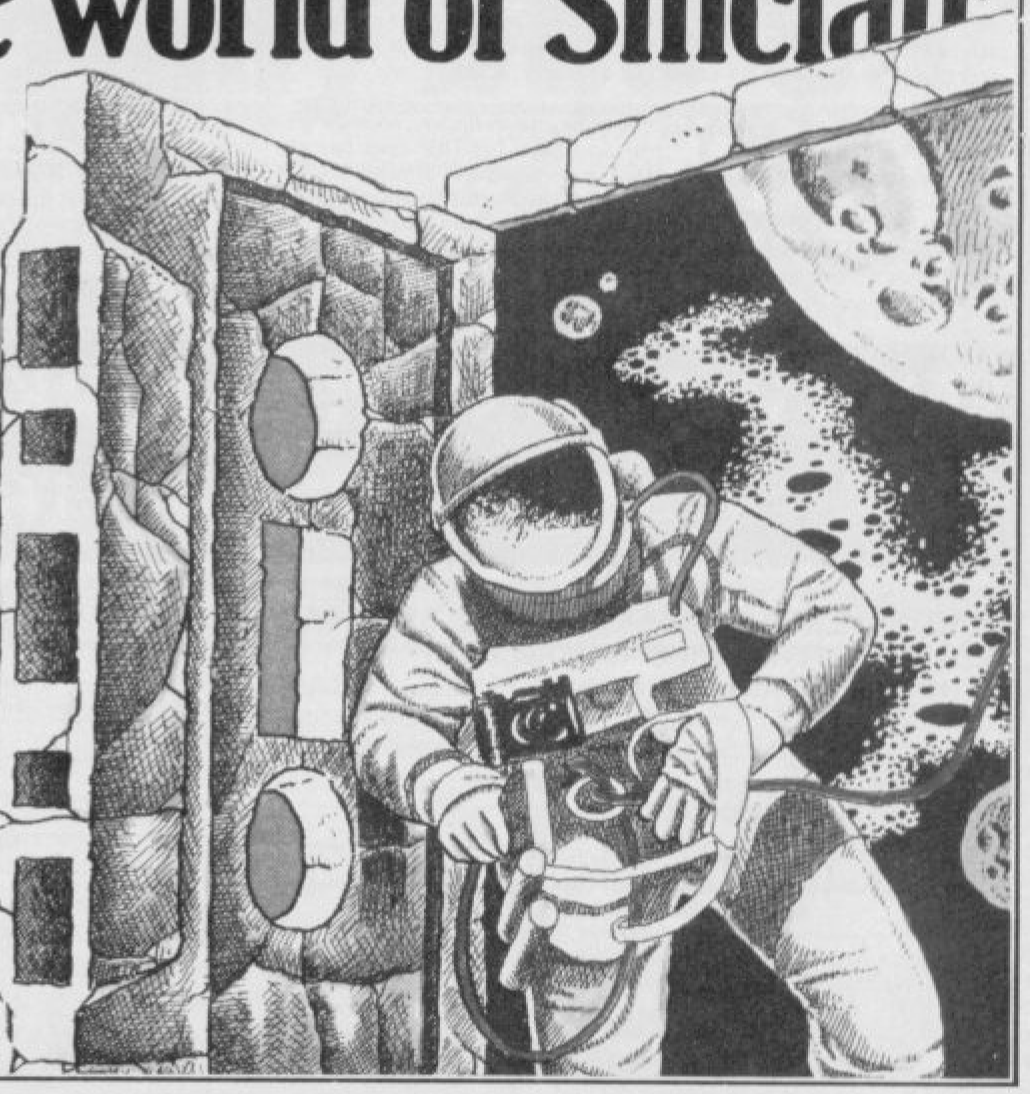
Across

4. Statistical diagram used in the meat trade? (3,5)
8. Top color scheme needed for communication between systems (8)
9. Enter C disassembled in the middle (6)
10. Beats Steve Davis at his own game? (8)
12. Shocking treatment of some Sprectrum owners (3)
13. Swashbuckling software thief (6)
14. It changes the form of energy and Cathode Ray Tube user (10)
17. Underground hit-man in crime (5,5)
19. Start the computer with the car door open? (4,2)
21. Distress signal when Gestapo surround ring (3)
22. Change data representation after ROM fault (8)
25. Access to tape is real problem (6)
26. BIN 00010011 (8)
27. Indecent exposure of colours on the blink (8)

Down

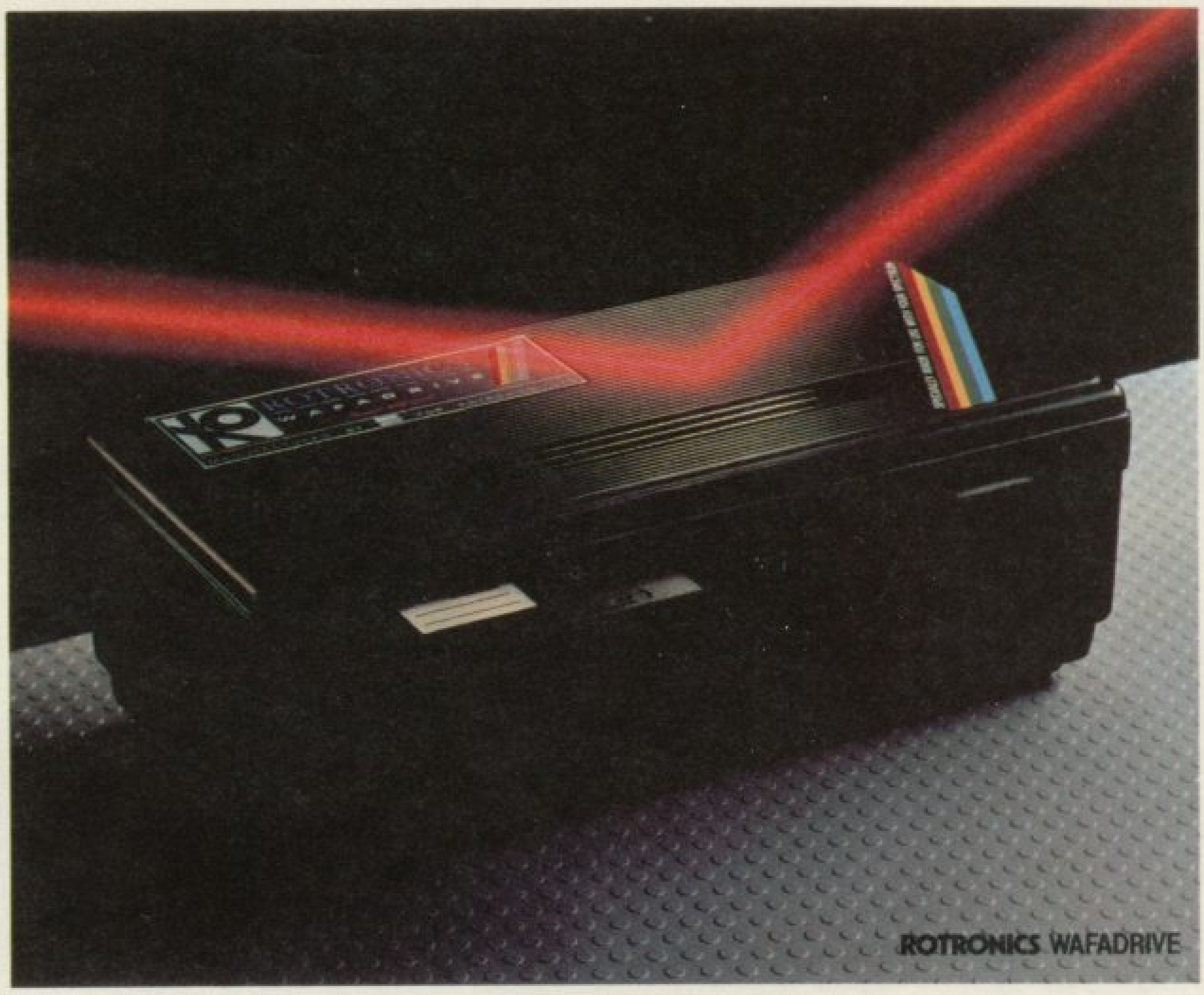
1 How to arrange oak, ash, elm etc. in order? (4,4)
2. Positions terminals (8)
3. Program to copy monitor display to printer (6,4)
4. Spectrum keyboard? — clasp it uneasily (7)
5. SIGNAL signal or SOUND sound? (4)
6. Journalist, with hesitation, becomes computer freak (6)
7. CHR$66 + CHR$65 + CHR$67 + CHR$75? (4)
11. Heard to understand C (3)
13. Sorting data and raw materials (10)
15. Tactful description of digital information (8)
16. When in a tangle, they take a long time to decode! (8)
18. Bird(bird(bird behaviour)behaviour)behaviour? (7)
19. Ban this code on goods? (3)
20. Tea and buns for adventure game nasties (5)
23. Live up to the powers of darkness (4)
24. Rise of one obscure musical interface (4)

Solution on page 142



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The Wafadrive achieves very fast loading and saving, but not at the expense of reliability. Extensive research and the use of high grade materials ensure that the Wafadrive will give years of dependable operation. Data integrity is on a par with floppy disk. Three fully interchangeable blank wafers in three sizes – 128K, 64K and 16K – are also included. Low capacity wafers give faster access. They are therefore most suitable for program development applications. The high capacity wafers are suitable for more general data storage. Loading rate is well over ten times as fast as cassette!

Software

Armed with the comprehensive user manuals, blank wafers and superb Spectral Writer word processor, you'll have a professional system to be proud of. See the coupon below for details of the rapidly growing range of software to enable the programmer and games player to exploit the Wafadrive system to the full.

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____	Heathrow/Nightflite II	@ £14.95 each	____
____	Space Wars/Seiddab Attack/Luna Attack	@ £14.95 each	____
____	Bear Bovver/Wong's Loopy Laundry/	@ £9.95 each	____
____	World Cup		
____	Starbike	@ £7.95 each	____
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Golden oldies

CHOOSING software is increasingly difficult, whether you are looking for games or serious applications. There is so much on the market that new users, in particular, may often miss the best buys altogether. If you read magazines such as *Sinclair User* regularly you can keep up with the new releases, but what about all the old stuff which was reviewed long before you bought a micro?

The *Which? Software Guide*, published by Hodder and Stoughton with the prestigious Consumers' Association, attempts to remedy the situation with reviews and ratings of more than 1000 programs. The software is for the BBC, Spectrum and Commodore computers, and grouped in categories by alphabetical order.

Written by John Walker, the reviews tend to be on the kind side, and you will probably spot many favourite turkeys among them. As a comparative guide to the quality of programs the ratings are generally acceptable, but although the book refers to the launch of the Spectrum Plus in October 1984, most of the software released after May of that year does not appear.

The bulk of reviews are for games, with the Spectrum badly represented in the business sections. The style is solid and readable. Walker has clearly played some games rather more thoroughly than others, and a few inconsistancies emerge. There seem to be remarkably few errors of fact for so many reviews, and those we spotted are fairly trivial.

Walker says he has not included products from 'firms which may only be in business a month or so'. Oddly enough, he includes several games from Imagine and Rabbit, companies no longer in business at all and which went down long before the book was published.

For Spectrum owners a more serious factor is the inclusion of games for more than one machine. The rating may well reflect the quality of graphics or sound on the Commodore version with the Spectrum game much less impressive. Occasionally that is pointed out; more often than not it is ignored. It would help if the book pointed out which version was the original.

On the plus side, there are a number of illuminating paragraphs on the origins of various types of game. A list of software houses and their addresses is an extra bonus.

At £7.95, the Guide is expensive. The introduction snipes at magazine reviewers for giving little detail about games; we disagree, naturally, but do not believe you will get a great deal more information from the reviews in the book. As a means of obtaining reliable information on what has already been published, however, the book can be recommended. It is certainly the sort of publication that newcomers will want if they intend to build up a library of commercial games software.

Chris Bourne

Which? Software Guide
Publisher: **Hodder & Stoughton**
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The mighty QL at play

TIM Hartnell is one of the grand old men of letters in the world of Sinclair books, having produced a prolific supply since the early days of the ZX-81. *QL Games Compendium* is a collection of fairly standard entertainments, more suited to those for whom the QL is their first computer.

The book contains 25 programs of varying length. Among old standards like Eliza — where the computer plays psychiatrist — Simon and Reversi you will find a couple of original adventures, a poetry generator, Draughts, and Stockbroker.

Although none of the games make any startling use of the QL facilities, and seem to have been adapted in the main from earlier programs for the Spectrum, they are good examples of simple programming which should appeal to novices. Hartnell also includes a chapter on other games, giving brief summaries of the rules as suggestions for readers' own programs.

The listings are reproduced from printer output, but are clear and easy to follow. There are few, if any, bugs, although Eliza started to behave strangely after a while. Perhaps that was due to perverse inputs rather than the programming itself.

Although Hartnell's collection is the best we have yet seen for the QL, there is room for programs of a much higher quality. It really is about time programmers turned their attention to games a little more original than Othello.

Chris Bourne

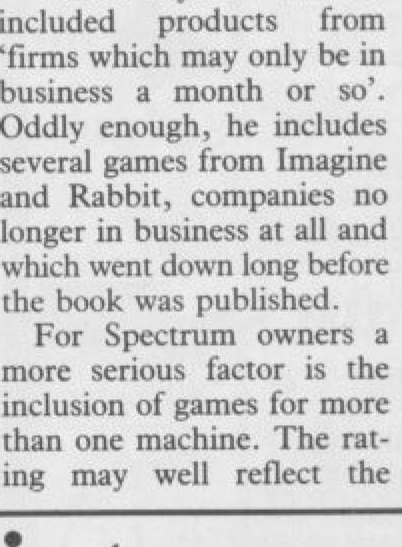
QL Games Compendium
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You don't own a freezer? Well, there are a lot more exciting things to do with your micro explained in Practical Uses for the Microcomputer in the Home by David Hole. David has written 14 staggering programs for bored technophiles seeking a more credible way of justifying their computer.

How about a television directory? Enter in the times and channels of your favourite television programmes. There are some excellent magazines such as *Radio Times* and *TV Times* which print those. Buy the magazines, type in the data, and then whenever you want to know when Wogan is on the box you can turn off the telly, plug in your Spectrum, and find out, liberating the magazines you bought for use as cat litter.



On the other hand, you might want to use the book for cat litter and keep the magazines. *Chris Bourne*

Practical Uses for the Microcomputer in the Home
Publisher: **Interface**
Price: **£4.95** (paperback)

Spectrum makes the grade: cramming in 48K

Theo Wood does some revision and looks at examination aids for O and CSE level

AT ABOUT this time of year those facing the ordeal of O Level and CSE exams start thinking about revision. Perhaps mock results were not too brilliant or were even disastrous. And, of course, your study notes seem to be an impenetrable mass.

Before computers the tried and tested method of aided revision was revision notebooks. Those were inexpensive and divided the subject matter into topics relative to examination questions. Computer programs can help in this area but also they can test your performance and give grades.

Science topics lend themselves more readily to this treatment, for at O and CSE Level factual learning is paramount; equations and formulae have to be learnt and their operation understood if a student is to have a chance of passing. That is not quite the case in a subject such as English Literature where although knowledge of text is necessary, that alone will not ensure a high grade; opinion and interpretation become more important.

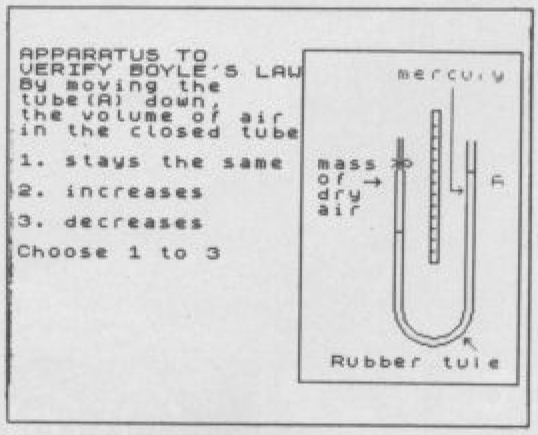
Rose Software has produced a program to aid O Level Physics, called **Light and Heat**, and it deals with those areas which appear on most syllabuses. The four programs break up the subject matter in easily digested pieces, with clear instructions and diagrams.

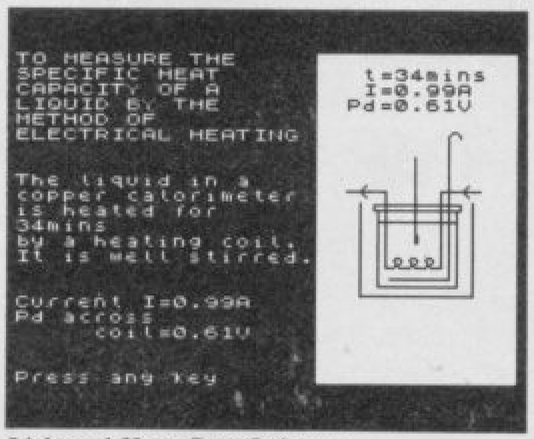
Multiple-choice questions test knowledge of a section and if the answer is incorrect a short explanation will be given. Formulae pertaining to the subject matter are indicated also. One possible drawback is that questions are not random; once answered there is no opportunity to practise application of knowledge.

The Scisoft study program **Physics** concentrates on testing with five programs of random questions. That can be useful if a student has already mastered the subject and only requires constant practice at using the knowledge. It is aimed at O Level, and the more able CSE, student.

Maths is another subject which lends itself to this treatment, but **Maths** produced by GCE Tutoring cannot be recommended. Obviously a product of the cottage software industry, the package is little different from an average textbook. All the main subjects are covered in eight programs but little effort has been made to simplify and instruct, unlike the Rose Software program.

In many cases the accompanying text would be of little help to a student floundering with the subject. No explanation is given, in some cases, when the incorrect answer is ENTERed, which means ignorance can well persist.





Light and Heat: Rose Software

In contrast, the larger publishing firms have developed alternative methods of study. A review of two Longman packages, **French** and **Biology** appeared in *Sinclair User* in January and its other programs follow the same pattern.

Physics comprises five programs, including **Text**, a database which covers all the main topics breaking them down into more accessible pieces; Formulae which tests the formulae required; and Light which enables the student to set up screen experiments using mirrors, lenses and prisms.

Longman win a prize for originality but they are not the best available. Rose Software must be congratulated on the way it presents the instructional sections, drawing heavily on the experience of the author. At the end day, however, all these packages have their shortcomings, being only study aids to certain parts of the syllabus or lacking in originality of approach.

Hill McGibbon has teamed up with Pan Books to provide the most comprehensive physics revision software packages on the market. Due to be published shortly, Pan Course Tutors cover the entire syllabus combining 25 study modules — two tapes — with a paperback book covering the course in more detail.

Diagnostic tests are taken first, rather like examination papers, followed by an analysis of answers and time taken, shown in graph form against a target time. Reports are then generated as to which modules would be useful.

Review copies were not available at time of writing, but the packages were displayed at the recent Computers in Education Exhibition and they suggest that Hill McGibbon is to be congratulated. At £14.95 the programs are almost twice the price of the others, but compared with the cost of hiring a private tutor the cost is not prohibitive.

Other software houses concentrate on the arts subjects and here Penguin Study Software has produced a most comprehensive collection of revision aids for English Literature, at both O and CSE Level. **The Merchant of Venice** package is representative, as all programs follow the same format. There is the conventional method of studying the play, where you can choose either to run through the acts alone, or ENTER plot, and a brief description of the plots will be given. Another feature is the facility to follow a character's development throughout the play by ENTERing, for example,

continued on page 56

continued from page 55

Shylock — all the relevant acts, and speeches will be indicated and questions asked. The answers are not given.

Penguin has adopted an original approach in that key words form a database menu and that can be used to examine key themes. That, however, can be confusing as the key words relate to references in the text only, and when studying a Shakespeare play it is useful to develop themes overall. ENTERing 'flesh', 'Shylock' and 'revenge' will return the message, 'I have found nothing, perhaps what you were looking for was insignificant'. In *The Merchant of Venice*? A good knowledge of the text would be a prerequisite of gaining the full advantage from this type of software.

Akadamias Software is a group of lecturers at the University College of North Wales who have adopted the more conventional approach. The program **Antony and Cleopatra** illustrates the format used throughout the range. A notebook is included which contains numerous examination-type questions. The program is divided into different sections covering plot, background, language, characterisation, imagery, themes and dramatic effects.

In the revision mode a question appears on the screen with an answer. The test mode operates on four levels, differentiated by the time allowed, in the form of multiple choice questions; you have only to press Y or N as relevant. Grades are given as each question is answered and 'behind time' messages appear on the screen.

Dr Margarette Smith's approach to *Antony and Cleopatra*, one of the more complex of Shakespeare's later tragedies, is impressive and she produces an easily comprehensible format and guide to the main problems of interpretation.

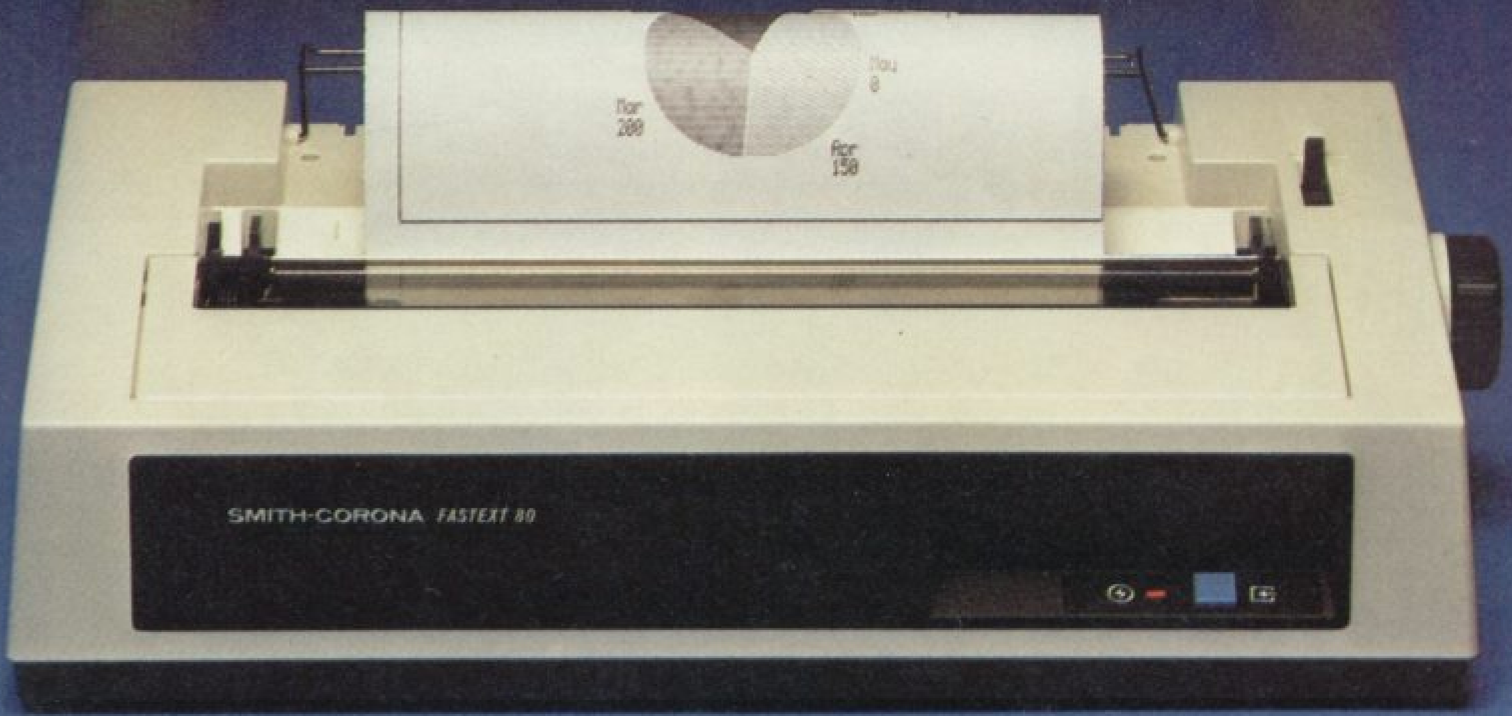
Akadamias Software has also produced a range of programs covering History topics, using the same format of revision and testing. Those encompass whole chunks of history, for example the Stuart period, or British History 1714-1815.

Although critics decry the use of a computer as a revision aid, those who are having difficulty with a subject or have missed some course work the programs reviewed can be extremely useful. The publishers mentioned supply programs covering a range of courses so it is worth checking for availability.

Rose Software 148 Widney Lane, Solihull, West Midlands. Tel 021-705-2895.
Scisoft, 5 Minster Gardens, Newthorpe, Eastwood, Nottingham.
GCE Tutoring, Tel 0494-711014.
Penguin and Hill McGibbon available through most bookshops.
Akadamias Software, University College of North Wales, Bangor, Gwynedd LL57 2DG.

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Light and Heat	48K	£6.95	7
Physics (Scisoft) ZX-81	16K	£7.50	7
Spectrum	48K	£8.95	7
Physics (Longman)	48K	£7.95	7
Physics (Hill McGibbon)	48K	£14.95	
Maths	48K	£7.95	6
Merchant of Venice	48K	£7.95	7
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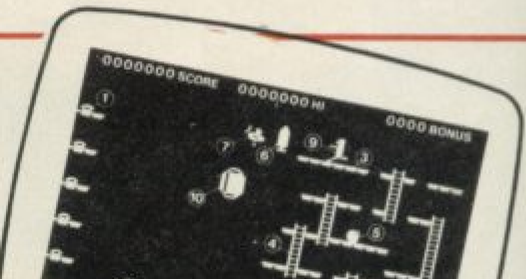
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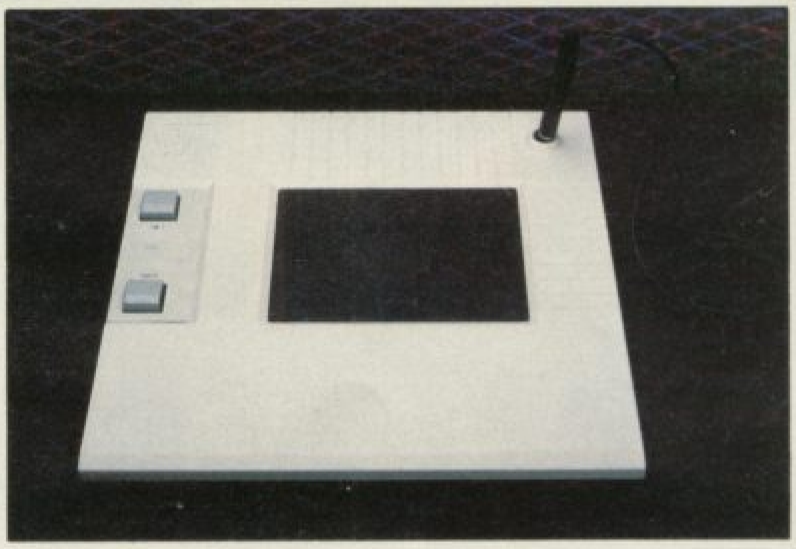
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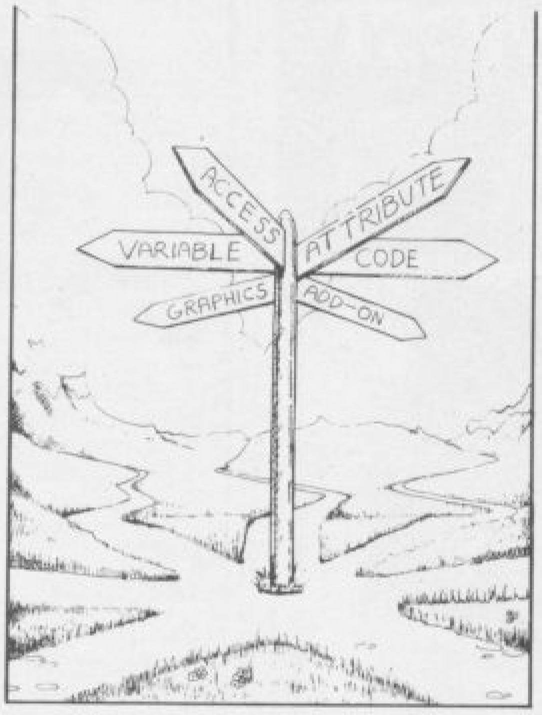
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The right route

John Gilbert points the way to the world of better Basic



LAST MONTH, in a preface to this series, we gave a rundown of information and equipment you will need to get your Spectrum up and running. You may have found already that being a beginner in the computer world is rather like learning to use a road atlas. You must identify all the correct route colours and outlines before travelling down them, and you must know where you are going.

That analogy can be applied right down the line with computers, from surface skills, such as exploring the keyboard and typing in commands, to a knowledge of Basic and programming techniques. If you follow the routes described in Entry Point you will have no trouble in getting to your destination — the heart of the Spectrum.

This month we locate that destination and trace some of the routes which lead there — the concepts of, and commands which achieve, input and output to and from your machine.

Input is a simple term which means the feeding of information into the computer where it is processed. Such processing may be addition and subtraction of numbers or storing information such as text. On the basic machine information is entered using the keyboard. When you press a key a series of operations takes place which ends in the computer receiving the character which you typed. Having said that, the computer cannot understand characters such as A,B,C. It can only understand patterns of numbers such as 11011010. So when you press, for example, key 'A' the keyboard sends out a number which is associated with that key. The number is a unique signal and tells the computer that the 'A' key has been pressed.

The signal is sent from the keyboard as an electrical charge, and is stored in Random Access Memory, or RAM, for as long as the power is on. Like the human brain, the computer RAM is able to retrieve information quickly in a random way. It can go straight to it using a pointer, explained later, which tells it where the specific piece of information, or data, which you need is stored. You would think your brain odd — and slow — if it had to look through every piece of information or experience to get to one specific cell.

When using the Basic language information is stored using cells within RAM, called variables. The values within those cells can be changed by you or by the Spectrum during a program.

Two types of statement can be used to change the values of those variables. The first is LET and is used within a program to assign a value. The program gets to the LET statement and automatically takes account of the new value.

The INPUT instruction, which is also used within a program, is more flexible than LET. The computer will stop when it encounters an INPUT command and ask you to enter a value which it will then put into a variable store.

There are two types of variable, string and numeric. String variables store words and letters. They will also store numbers if you do not want to perform any mathematical operations with them. The name of a string variable must consist of only one character, which must be non-numeric, and is suffixed with a '$' symbol. Therefore A$ is permissible but ABLE$ is not.

When entering a string using INPUT or LET the whole entry is enclosed within quotation marks. If you wanted to store MANIC in A$ using LET you would type:

10 LET A$="MANIC"

The '=' symbol tells the Spectrum to put MANIC into A$. If you also wanted to store MANIC in another variable, called B$, you could make a copy of it using A$.

20 LET B$=A$

Line 20 will transfer a copy of A$ to the new variable. You do not need to use quotation marks as you have already set up the string in A$.

Although you cannot perform mathematical operations on numbers in strings you can add strings together. You may have two strings stored in variables A$ and B$. A$ contains the word SINCLAIR and B$ contains USER. All you have to do to make one string is to add them together, using the '+' symbol, and store the result in a third variable, C$.

10 LET C$=A$+B$

The same effect can also be achieved by:

10 LET C$="SINCLAIR" + "USER"

but do not forget the quotation marks.

Numeric variable names have the same length restriction as that of strings. You do not, however, have to put the '$' suffix onto numeric names. Quotation marks are also not required so, to enter a LET statement which puts the value 20 into the variable C you type:

10 LET C=20

You can manipulate the values stored within numeric variables using any of the mathematical operators available on the Spectrum — +,−,/,*. If, for example, you wanted to add 10 to the value stored in C, above, you would enter:

20 LET C=C+10

You could also have put the value 10 into a variable and added that to C.

20 LET C=C+D

The other type of input is achieved using a command of the same name — INPUT. A variable name should always be present on the INPUT line and it is within that variable that any information you type in will be stored. Type in the line

10 INPUT A$

Press the RUN key and ENTER. At the bottom of the screen you will see a flashing cursor. If you type a few characters the cursor will move putting them between the quotes. Press ENTER and the information, or characters, will be stored in RAM for later use. The quote marks show that the

continued on page 64

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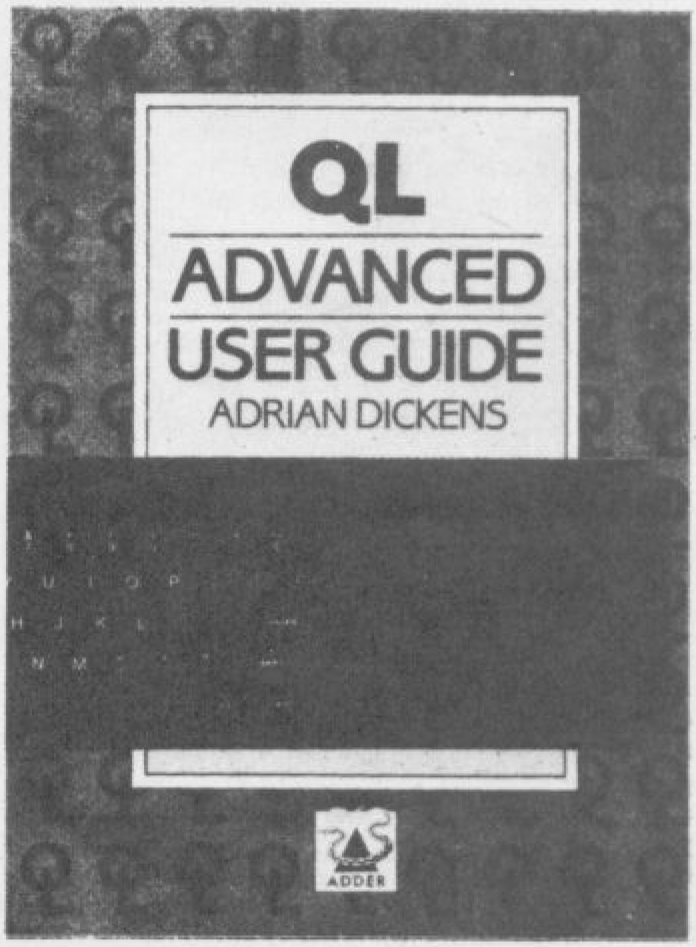
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THE BOOK

The QL Advanced User Guide (£12.95*) has been written by Adrian Dickens in collaboration with Tony Tebby (QDOS System designer). It is the complete guide to QDOS and the Sinclair QL, covering multi-tasking, transient programs, resident procedures, heaps and stacks, traps and utilities, 68008 assembler programming plus much more. All of these features are illustrated by practical examples, and the powerful QDOS experimentor program allows many facilities to be tried out from BASIC. All of the programs from the book are available on a microdrive cartridge which can be purchased with the book (£9.95*).

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SU 4

continued from page 61

computer is waiting for you to enter a string. They are not particularly conspicuous so you may want to add a line of text before the quote marks to explain what type of input is required. For instance, typing

10 INPUT "ENTER A WORD", A$

would display at the bottom of the screen

ENTER A WORD " "

You can put any text before a variable name such as A$, just by enclosing it within the usual quotes. The comma separates the text from the variable in which the string is to be stored and should always be included as part of such a line.

All types of string and numeric variables are shown in listing one at lines 10 to 20. The variable L is used in a special way. At line 10 it is given the value 20. It is then used in GOTO lines 80, 130 and 160 instead of numbers. On all those lines the program will go the line whose value is in L.

Output on the Spectrum usually means display, which involves the machine obeying one of your program instructions and putting the result on the screen. The process is complex and involves the memory pointer referred to earlier.

The Spectrum brain is the Z-80A microprocessor. The number is a code which identifies it to programmers so they know which language to use when trying to communicate with it. Those machine languages, or codes, are beyond the scope of these articles so suffice it to say that all computers have their own special number language. You may be surprised to learn that computers cannot understand your Basic programs and the Z-80A needs some help from a special program, written in its own language, which translates Basic into the same machine language.

That program is an interpreter and is stored in Read Only Memory, ROM. ROM is similar to RAM but anything which you store in it will not disappear when you switch off the power. It is permanent storage, rather like the print on this page.

The interpreter will take each line of your Basic program and translate it. Then it will carry it out. For instance, line 150 in listing one has the statement

PRINT "THE ENGINE STOPS"

The computer will see that the task it has to carry out is a PRINT to the screen. It takes the string between the quotation marks and prints it onto the screen.

The screen is made of two parts. You can print on the top 21 lines, using the PRINT statement, or display your messages on the bottom two lines which are normally reserved for editing programs and displaying error messages.

It is possible for you to select which part of the screen you want by using the Spectrum channels. Those are pathways within the Spectrum through which information travels into and out of the machine. Each is given a code number which you can use in PRINT statements to identify a channel.

The channel for the lower part of the screen is '1' and to use it in a PRINT statement you must prefix the number with a hash mark #. For example, if you wanted to print HELLO on the bottom of the screen you would type.

10 PRINT # 0, "HELLO": PAUSE 0

If you run the line after clearing the screen HELLO will be printed. PAUSE 0 is added to line 10 as HELLO will be wiped from the screen when the Spectrum finishes the program and prints 0 OK 10:2 over it.

The output sections of this month's program are contained in lines 25, 150, and 180. Line 25 prints a result of the calculations done within the program while the other two lines print simple messages which show the status of those calculations.

Next month I will continue the theme of input and output but show how you can convert characters into their code numbers and how to compress information in memory. The Entry Program of the month will be a simple text compression routine.

Listing 1: The routine simulates a petrol tank. Petrol goes through a pipe to the engine, the flow increasing until it is at maximum. You can fill up the tank when requested or, by pressing ENTER, continue to run the engine. When the tank is empty a warning sign is given on the screen.

Line 5 clears the screen while **line 10** sets up all the variables which are to be used in the program. T=petrol in tank. F=flow of petrol from tank which increases each turn by 0.2 until a full five units is flowing.

Line 20 asks whether you want to refill the tank. **Line 25** clears the screen again and prints at position 10, 10 the number of petrol units in the tank. **Line 30** transfers control to line 90 if a$ contains a 'y', YES, response from line 20.

Line 40 starts the main processing of information within the program. It checks if the petrol in the tank is less than or equal to 1.2. If it is, the tank is empty and control is transferred to line 140. **Line 50** adds 0.2 to the fuel flow going up the pipe from the tank. **Line 60** checks to see if the pressure is more than five units per square inch and if it is readadjusts the value to the maximum five.

Line 70 subtracts the amount which has flowed from the tank in that turn. Control is then transferred to line 20 via **line 80.**

Line 90 starts the routine which refills the tank to your specifications. **Line 100** asks you to INPUT the number of units of fuel you require in the tank and puts it in U. **Line 110** checks if the total in the tank, plus the extra you are going to put in, is more than can be accepted and if so then go to 170 where you are informed that the tank is full. If the tank will not be filled by the new input add it to the contents of the tank and, at line 130, go to line 20.

Line 150 ensures that the tank is empty in order that the result of refilling it is correct — we don't want any residue — and then informs you of the fact.

Line 180 informs the user that the tank is full. The message is displayed AT position 10,10 on the screen.

```
   5 CLS
  10 LET t=0: LET s=0: LET f=0:
LET 1=20
  20 INPUT "Fill ?",a$
  25 CLS : PRINT AT 10,10;"Tank=
";t;" units      "
  30 IF a$="y" THEN  GO TO 90
  40 IF t<=1.2 THEN  GO TO 140
  50 LET f=f+0.2
  60 IF f>5 THEN  LET f=5
  70 LET t=t-f
  80 GO TO 1
  90 REM refill
 100 INPUT "How many units",u
 110 IF t+u>20 THEN  GO TO 170
 120 LET t=t+u
 130 GO TO 1
 140 REM empty
 150 LET T=0: PRINT "The engine
stops"
 160 GO TO 1
 170 REM full
 180 PRINT AT 10,10;"Tank full"
 190 GO TO 40
```

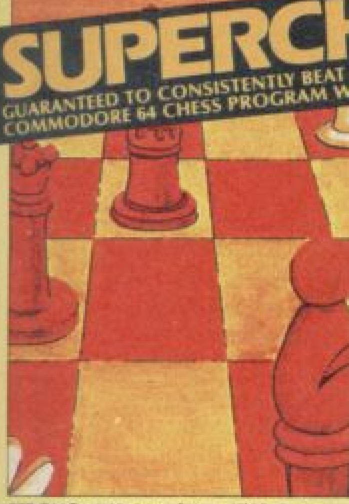
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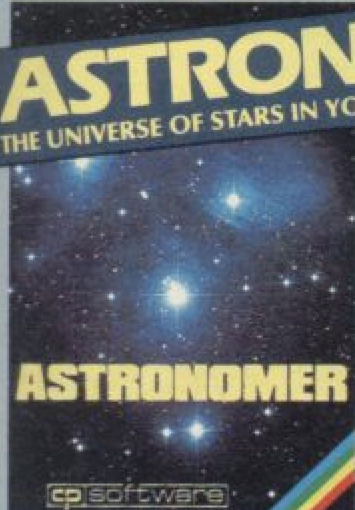
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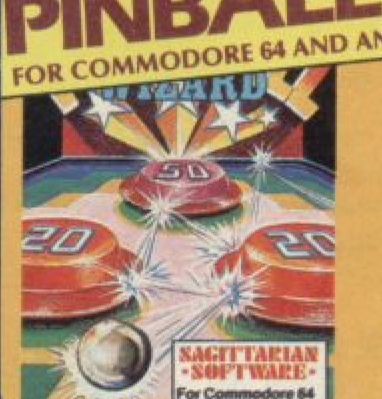
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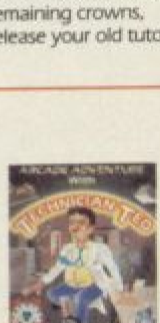
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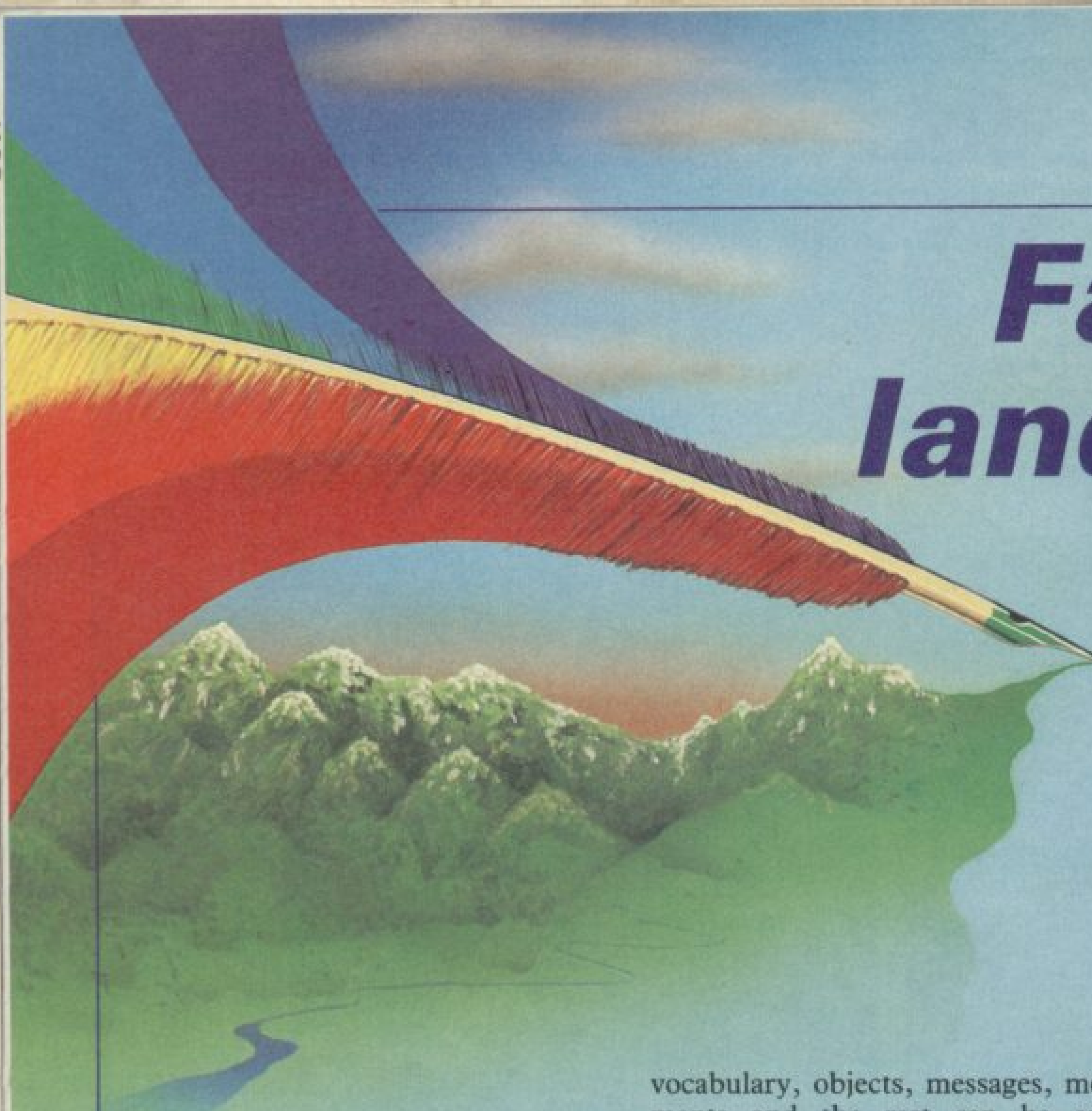
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Fantastic landscapes

Quill liberates the imagination of adventurers. Richard Price meets its master

Illustration: Mark Watkinson

WHEN THE QUILL appeared in late '83 it soon became clear that the utility was a milestone in the popularisation of adventure gaming. Before **Quill** only buffs with extensive programming experience and knowledge of machine code could hope to produce large, fast and responsive home-made adventures.

Quillpower put an end to that. Amateurs and small one-horse companies now churn out truckloads of games written with its aid. Even big software firms, always with an eye on mass appeal and the main chance, will gladly market well-Quilled adventures — **Hampstead** is one of the most recent and notable.

Budding game designers who buy **The Quill** find they are given all they need to produce text adventures which can be compared in style with Artic's 'Alphabet' series. User-defined graphics are also provided with the utility but those are limited. Those who want to add more complex location graphics to their games can now turn to Gilsoft's recently released **Illustrator**. That is fully compatible with Quilled games and allows locations to be drawn with a cursor-controlled sketchpad.

The Quill is menu-driven. Each section covers one aspect of the data needed in adventures. Descriptions, vocabulary, objects, messages, movements and the rest can be easily inserted, amended or edited. Complete or partial games can be reloaded into the main program for further work. You will find everything you need to produce a polished and professional-looking game.

The manual is very full. At first you may be a little daunted by its occasionally heavy style but if you work through it carefully and use the mini adventure provided as a teaching aid, you will soon pick up the routines used. You won't need any in-depth knowledge of either Basic or code programming before you begin — though some familiarity with concepts like Flag functions should help a lot.

All this programming power uses up about only 7K of RAM so there is a lot of memory left for your own data — just the way it should be. You can create adventures with up to 200 locations if you are feeling energetic.

What about copyright? Well, if you try to sell your game Gilsoft's only request is that you give them due credit and mention **The Quill.** Some games don't do that and there's no justifiable excuse for this discourtesy as it costs nothing. Finding the reference can even form part of the game — in **Project X — The Microman** you may well discover a box hidden in some foliage. Open it up and out pops Gilsoft and **The Quill**.

Generally, then, you will be able to recognise a Quilled adventure from the credit but there are other standard features which make it distinctive.

The interpreter operates on the classic verb/noun input and understands only the first four letters of each word. All your entries can thus be abbreviated for speed's sake. Confusion will only occur if there are two words or more in the vocabulary with similar openings. The whole screen scrolls up as you enter text and the location descriptions will disappear bit by bit. Typing Redesc or R will call it back and clear the screen for you. The more familiar Look command operates rather like Examine does on other interpreters.

There are a bundle of preprogrammed messages within the system including a very distinctive Quit routine featuring a yes/no interlude asking you if you really want to end it all. Up to now those messages could not be changed but Gilsoft have issued an upgrade of the original program which will allow everything to be edited.

You will also come across other inbuilt routines which can be used to produce introductory title screens or the dreaded limited move sequence. Game after game employs that to warn you that you are getting hungry, weak or thirsty. In **Denis Through The Drinking Glass** you are given only ten moves to locate a drop of the hard stuff — right at the beginning.

Surviving in such situations can be tricky and nerve racking. In Runesoft's curious **Paradox** you not only have to cope with an apparently random location system but also find some water within the time limit, again at the very start of the adventure. The system can be used more subtly than that — for instance, a journey on a train can be given a definite duration.

Gilsoft, the company behind **The**

Quill, is owned and run by Tim Gilberts, a soft spoken twenty-year old Welshman. Tim is a product of the whizz-kid era and left school early to get into computing.

"Gilsoft started mainly as a pocket money venture. I bought myself a Spectrum when it came on the market and pretty soon had a full-scale business on my hands. I suppose I could have gone to university and ended up working for some big company but I haven't got any regrets about that. I'm doing what I enjoy and it all helps to pay for my beer and a car." Not a Porsche, he adds wryly.

His philosophy is to turn out quality products with a long life, not to rely on flash-in-the-pan megagames or the like. "We all know where that leads. You only have to look at all the firms collapsing because they can't pay their advertisers and suppliers. We do some advertising but it's far too expensive these days — we have to rely a lot on people getting to know about us. We may not make big money but it's better to have a regular business."

The Quill came along almost accidentally. Graham Yeandle, a friend of Tim and a systems analyst by profession, mentioned one day that he had been swapping adventures he'd written in machine code — including **The Magic Castle** in the current Gilsoft Gold series of games.

Tim borrowed the basic program, looked it over and did some debugging. "After that, Graham and I talked it over and decided it was worth trying to develop an adventure writing program based on it. Graham went off and I didn't hear much from him for a few months. He's a pretty dedicated programmer and when he came back he had what amounted to a pre-production copy."

Graham and Tim spent nearly a year developing the system to its current state. Because Graham was working as a freelance and lived some way away, much of the business was done on the phone.

How did **The Quill** reach its present form? It adopts a fairly 'classic' style in some ways and does not have features like full sentence analysis or 'interactive' character capability.

"I think you've got to remember what it was designed for. We wanted to encourage non-programmers to write their own games and it was specifically intended for the amateur or semi-professional. If we'd made it more complicated and fancy it would have meant that you'd find it far more difficult to produce a decent game. The whole object would have been defeated."

Tim is not particularly keen on highly complex interpreters in adventure anyway. "In some ways that kind of thing can actually limit communication. You'll often have to spend time working out the right phrase to use before a character will respond or you get the action you want. Even then you will find that some dwarf will only end up singing about gold or you just get another free lunch. The 'Inglish' used in games like **The Hobbit** can be quite quixotic and difficult to fathom. I really do prefer to play games with the usual verb/noun entry."

In the main Tim feels that any increase in the sophistication of the interpreter would have meant a trade-off against memory space — always of prime importance for large atmospheric adventures.

'Distributors don't seem to be interested in anything but fairly mindless reflex games.'

Whilst admitting there are some limitations he still considers **The Quill** to be the most advanced adventure writing system available for home computers.

One of its major attractions is that Gilsoft expect no royalties on adventures written with it. Now that firms like Melbourne House have started to sell such games does Tim have any doubts about the wisdom of that decision?

"Not at all. I think it's great. It backs our product up. It shows that **The Quill** can produce top-quality adventures and isn't just some kind of toy. Look at it this way — when you go into a shop and buy a Black and Decker drill you pay your money and take it home. You can then drill as many holes as you like. That's what tools are for — you wouldn't expect to have to send off money every time you put in a rawlplug."

Tim reserves his disapproval only for those who copy and pirate the editor itself. "Nobody's making millions out of **The Quill** and the writer deserves his rewards. Copying the editor is just the same as someone breaking into Graham's house and stealing his cash box. There are pirated versions around that are just appalling — and it's so difficult to do anything about it. It's worst abroad. I'm scared even to send samples to places like Spain or Portugal."

The Quill has kept Gilsoft busy. There have been conversions for quite a number of other machines including the Commodore 64 and the Amstrad. What about the QL? "Well, the QL is a brave attempt to take the hardware somewhere but Sinclair should really have used a disc-based system. It's possible we'll do a 68000 version but this'll depend a lot on QL sales and the popularity of the microdrive."

In the future Tim hopes that the firm may be able to produce a text compressor which could help to overcome some of the Spectrum memory limitations. A subroutine editor is also a possibility.

"We'd like a new product if possible, something that hits like **The Quill**. Mind you we're working full tilt now but you never know how the market will go. I'd like to see programs that have a lot more content than the average arcade game but the distributors don't seem to be interested in anything but fairly mindless reflex games."

What's certain is that Gilsoft will continue to support adventure software at a reasonable price. At £1.99 the Gold range is good value even if some of the games vary in quality.

The company is also collaborating on a range of bargain price 'Double Play' adventures. Those should soon be available at £2.50 or thereabouts. Each cassette will feature two entirely separate games. Tim hopes that they will be sold like paperbacks in newsagents and other smaller outlets — "A bit like Mills and Boon, good value and good entertainment for the same sort of price as a book."

The Quill has definitely helped to keep the adventure alive in the face of stiff competition from the arcade market and uninterested distributors. The last word should go to Gilsoft: "Anyone who wants to write can produce a novel without technical knowledge. You may not create great art but there's nothing to stop you trying. **The Quill** has opened up the same kind of opportunity to those who enjoy adventuring. We've tried to provide the computer equivalent of pen and paper."

At the sign of THE DANCING OGRE

Gordo Greatbelly embarks upon his quest, picking up hints and tips for adventurers along the road.

WE SET off on our road to the fleshpots of Maru, laden with many provisions and weapons. Zul and Zel were nowhere to be seen until a final search revealed them sleeping behind the manure heap in the stables. There were tearful farewells, the greatest and the wettest being between myself and my strongbox — now protected with many strong curses.

I confess I was worried as to whether Uginnuk, the troll I captured and house-trained many years ago, would be capable of caring properly for my customers instead of eating them — he is not always totally reliable in this way and old habits die hard. Let us hope my clients will be stringy in the main and not tempt him!

We headed over the moors towards the southern passes. Meeting a group of adventurers we camped for the night. Having befriended them I sold them a keg of wine and listened to their tales.

One Olaf the Storyteller from Clophill talked of his travels with **The Hobbit** *in Middle Earth. He has found a way to engender dissension amongst friend and foe alike. While wearing the Ring of Power, thus invisible, he found himself in the company of Elrond, Gandalf, Thorin, Gollum and a disgusting goblin. When Olaf struck Gandalf, half in fun. I suppose, Gandalf assumed Thorin had done this deed and hit him back. A sharp slap administered to Thorin set the whole company ablaze and a giant brawl resulted. You may try this yourself to enliven the long journey to the dragon's lair.*

Others, as is so common, related their woes and problems in this land. Martin the Campbell, a valiant Scot from Lesmahagow, could not slay the dragon Smaug. Listen, I said to him, first find Bard the archer and carry him with you. When the set-to begins Bard will shoot Smaug if instructed. At this, Nick 'The Knuckle' Rogers, a little maudlin with the wine, confessed his utter inability to escape the Elven King's cellar. He had gone so far as to slay the poor butler in his rage! If I understood him correctly I tell him now not to enter a barrel. Let the butler throw one in the stream and then jump upon it. That may be best for all — especially the butler.

And so the talk came round to **Ket**, *favoured by many. Puncher Parsons has had regular encounters with the Zombie who prevents exit from the mountain caverns. There were many voices in reply. Our solution was that he should drop all but his sword and magic staff and, after donning his armour and ring, should go on.*

The river of lava which interrupts the road to the **Temple of Vran** *blocks Axeman Wood's path — he hails from Abingdon. If he can find the stepladders at the base of the great cliff and uses them with a trampoline, he may achieve his object. But first he must descend the cliff . . .*

There were more tales from Orcslayer Fletcher of Gloucester, who had much advice on **Eureka** *within whose time zones he had journed long. In the Roman time he obtained the swamprose by going to the south gate. From there south, east, southwest, east and south again. The travellers, slightly foxed by now, were more amazed by the means to gain the Arthurian magic ring. Mentioning a minstrel, Elvis by name, he told us to play the harp and then, when asked for a tune, to strum out* Jailhouse Rock, *whatever that may be!*

Orcslayer will answer questions on the prehistoric and the Arthurian ages for anyone who cares to write to him at 64 Barnwood Road, Gloucester — so long as they pay the price for the courier's return trip! Help him if you can blow up the bridge without destroying yourselves in the process.

Espionage Island *featured large in our conversations again. Red Nicola of Worcester has always been foiled by that dark bundle which, I verily believe, is the parachute. I suggested to her that maybe she should unstrap herself from it. Her companion, Goblinsbane Gould from Leicester suffered too. The crevasse always bars his way. If he has a stick he may find that dropping it renders him unstuck. Directions past the swamp may be given in some stitching. Perhaps he gets my drift?*

Crusher Barles of Redcar has attempted to break into the safe for many moons and is awash with numbers. Scrawled grafitti elsewhere will unlock this little



problem for him if he read them right.

He had another puzzle I could not solve for him — maybe you all can help. In the arcane depths of the **Dungeon Adventure**, *one of Level 9's spells, he can gain all nine gems needed to escape from the central dungeon of the Demon Lord but cannot carry those and the Branch. When he passes through the door without the Branch he perishes. Write to Crusher care of Dungeon No One, 37 Broadway West, Dormanstown, Redcar, Cleveland. He will be eternally grateful and can give help in return on Artic's A, B and C and the first two quests of Ket.*

As I browsed through my letters by the dying torchlight I found a number from warlocks trapped within **System 15000**, *including Knifer Boon of Maldon, Stunner Johns of Houston and the doughty Pugh of Twyford. To help is difficult in this ritual since it is hard to know exactly how much you understand already. So . . . I will provide some numbers.*

Calling Routledge will give important advice on those behind the swindle. Also Perry's specific code is VIN 15 — instead of INFRA — and will give further routes for your investigation. SELCRA will not reveal all about every company but follow the track of some large fruit and you may pip 537 at the post! Surely this is clear enough?

One thing more. My deepest thanks to the Lady Marion, Guardian of the Barbican, for her encouragement and wise counsel. I shall wear her favour on my sleeve throughout this perilous quest and treasure it on my safe return.

And so we all fell asleep with Zul and Zel on guard, I had a peaceful night except for their waking me to tell me my snores were frightening the horses. Until next moon my friends. Ride safely.

Gordo Greatbelly, Landlord.

If you have a tale to tell, or are in need of a helping hand, write to the Landlord of the Dancing Ogre c/o Sinclair User, Priory Court, 30-32 Farringdon Lane, London EC1R 5BH.

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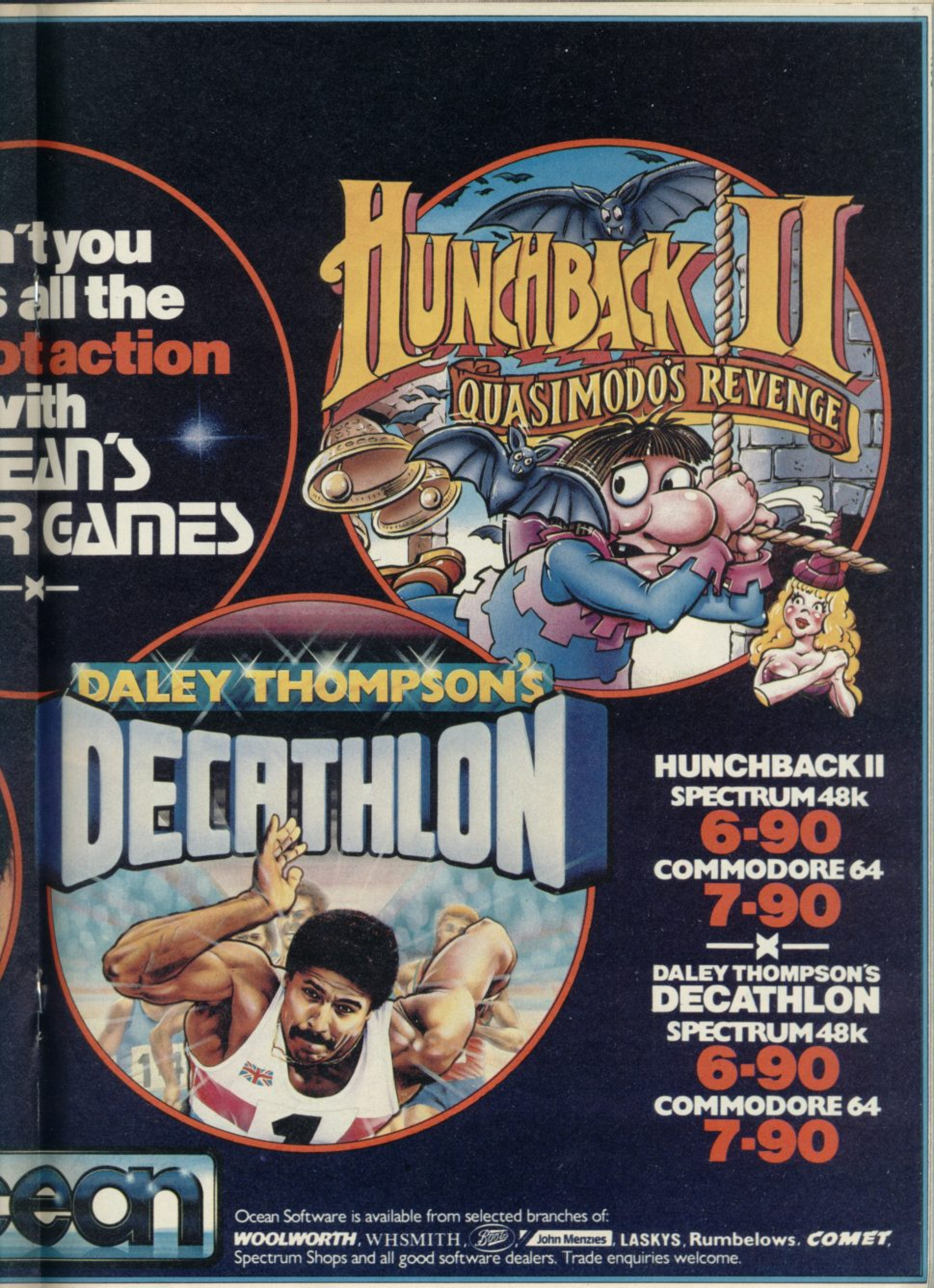
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Plotting the right changes

Mark Jarrard brings the Spectrum to life with a point-by-point graphic display

Fed up with all those stationary graphics? Want a little animation, easily? Well, this is it. All you have to do is type in the program as given, plot the points for a few pictures, and let the program do the rest.

The idea can be seen clearly in diagrams one to four. The pentagon in the first diagram consists of five points, labelled 1 to 5, which are joined in sequence. In other words: point 1 is joined to point 2; point 2 is joined to point 3; and so on until point 5 is joined to point 1.

The fourth diagram consists of the same points, joined in the same way, but in different positions. Give the program the start and end positions of

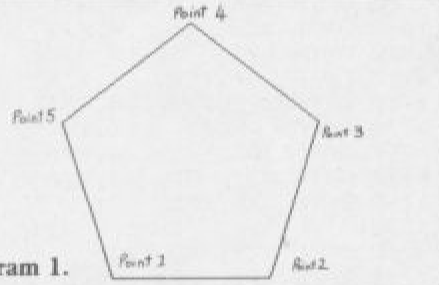


Diagram 1.

each point, and tell it which points are joined. The program will then transform the points from the first picture to form the second, with real-time motion on the screen. Diagrams two and three show a couple of the steps in the transformation from the pentagon into the pentangle. In reality, you specify how many steps the transformation will take, so you can produce smooth on-screen motion.

The program can be typed in and run as listed. The shape data included from line 860 will spell out SINCLAIR. It does that by plotting a shape resembling an 'S', then transforming it into an 'I', and so on. When it reaches the end of the sequence it loops around to start again.

The program will keep looping through the shapes, but if you want to stop it after a complete cycle, change line 830 to a STOP. Having plotted each shape — not the transformations between shapes — the program waits for a moment so that you can see it. If you don't want that, then just delete line 810.

Before you try this out, a word of warning. The program contains a machine code loader routine, which has a checksum incorporated. If you have made an error when typing in all that data, the program will stop and tell you. In the unlikely event that you have made an error, but the checksum does not spot it, then it is possible you could find the machine code overwriting your program, so save the program to tape first.

Having tried out the demonstration shape data, you are probably itching to experiment with your own shapes. First you have to plot the shapes you want to draw. That is best done on a piece of graph paper, but notice that the program uses a slightly different coordinate system than you would normally expect on a Spectrum. To make the machine code calculations a little easier, the origin is placed at the top-left of the screen — diagram five. Next, the data can be entered, in the following order.

First, the number of steps to transform from one shape to the next. If the number of steps is large, the coordinate change from one point to the next is likely to include fractions. In this program, those have been rounded to the nearest integer, and that can cause a small jerk in the picture when it reaches its target shape.

continued on page 78

Picture transformation program.

```
  10 REM *** PICTURE TRANSFORMAT
ION PROGRAM ***
  20:
  30 REM ** Clear area for machi
ne code and tables **
  40 CLEAR 45055
  50 REM ** Load the machine cod
e into memory (B000h upwards)
  60 GO SUB 1110
  70 RESTORE 870
  80 READ steps,points,lines,sha
pes
  90 LET m=2*shapes
 100 REM ** Byte tables start at
C000h
 110 LET s=49152
 120 LET c=s+m*points
 130 LET l=c+m*points
 140 LET p=l+2*lines
 150 LET n=p+2*points
 160 LET steps=steps-1
 170 LET points=points-1
 180 LET lines=lines-1
 190:
 200 REM ** Poke the table start
locations
 210 POKE 45065,INT (l/256): POK
E 45064,INT (l-PEEK (45065)*256)
 220 POKE 45067,INT (n/256): POK
E 45066,INT (n-PEEK (45067)*256)
 230 POKE 45069,INT (p/256): POK
E 45068,INT (p-PEEK (45069)*256)
 240 POKE 45074,lines+1
 250 POKE 45075,points+1
 260 POKE 45077,INT (c/256): POK
E 45076,INT (c-PEEK (45077)*256)
 270 POKE 45079,m
 280:
 290 REM ** Read the coordinates
for points in each shape
 300 FOR i=0 TO points
 310 FOR j=0 TO shapes-1
 320 READ x,y
 330 POKE (s+m*i+2*j),x
 340 POKE (s+m*i+2*j+1),y
 350 NEXT j: NEXT i
 360:
 370 REM ** Calculate offsets be
tween shapes for each point
 380 FOR i=0 TO lines
 390 READ pt1,pt2
 400 POKE (l+2*i),pt1
 410 POKE (l+2*i+1),pt2
 420 NEXT i
 430:
 440 FOR i=0 TO points
 450 FOR j=0 TO shapes-1
 460 LET k=j+1: IF k=shapes THEN
 LET k=0
 470 LET cx=(PEEK (s+m*i+2*k)-PE
EK (s+m*i+2*j))/steps
 480 LET cy=(PEEK (s+m*i+2*k+1)-
PEEK (s+m*i+2*j+1))/steps
 490 POKE (c+m*i+2*j),INT (cx+0.
5)
 500 POKE (c+m*i+2*j+1),INT (cy+
0.5)
 510 NEXT j: NEXT i
 520:
 530 REM ** Set previous shape n
umber to zero
 540 LET y=0
 550:
 560 REM ** Set the n(ext) shape
points to zero for first plot
 570 FOR i=0 TO points
 580 POKE (n+2*i),0
 590 POKE (n+2*i+1),0
 600 NEXT i
 610:
 620 CLS
 630:
 640 REM ** MAIN SHAPE LOOP **
 650:
 660 REM ** x=present shape; y=n
ext shape
 670 LET x=y
 680 POKE 45078,x
 690 LET y=x+1: IF y=shapes THEN
 LET y=0
 700 REM ** Set start coordinate
s for shape x
 710 FOR i=0 TO points
 720 POKE (p+2*i),PEEK (s+m*i+2*
x)
 730 POKE (p+2*i+1),PEEK (s+m*i+
2*x+1)
 740 NEXT i
 750:
 760 REM ** Main transform shape
loop
 770 FOR k=0 TO steps
 780 REM ** Call machine code
 790 RANDOMIZE USR 45080
 800 REM ** Delay loop at start
of transformation
 810 IF k=0 THEN  FOR j=1 TO 200
: NEXT j
```

continued from page 77

There are two ways of avoiding that, the first being to adapt the routines to handle floating point numbers. An easier method is to ensure that the coordinate changes for every point are divisible by a particular number. In the data given in the program, all the coordinates are multiples of 10, and the number of steps is

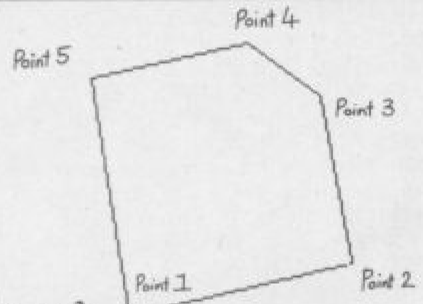


Diagram 2.

set to 11 — that is, the first shape and 10 steps.

Second, the next two figures should be the number of points, followed by

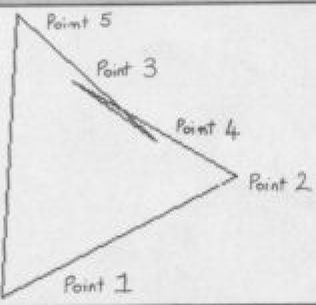


Diagram 3.

the number of lines. In the example data, those are both the same. Including more points than lines would be pointless(!) but there is no reason why

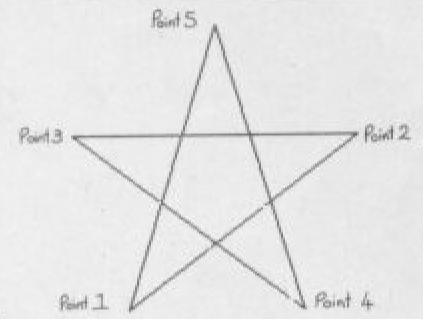


Diagram 4.

each of, say, four points should not be joined to all the rest, giving six lines.

There is also no reason for all the points to be joined into a circular sequence — the middle 'hole' in the 'A' and the 'R' show that quite nicely, being three points separated from the rest. Those are normally plotted at location (0,0) and brought onto the main screen when needed. That has a tendency to plot a small dot in the top left hand corner, but you can easily avoid that by plotting the points entirely off the screen.

If you need a large number of points for one shape, but fewer for other

continued on page 80

```
 820 NEXT k
 830 GO TO 670
 840:
 850:
 860 REM ** SHAPE DATA **
 870 DATA 11,19,19,8
 880 DATA  50,130,150, 10, 50,10
0,150,130, 70, 30, 50,150,150, 1
0, 50,150
 890 DATA 100,150, 50, 10, 50,15
0,140,110, 70, 10, 50,150, 50, 1
0, 70,150
 900 DATA 150,130, 50, 30, 70,15
0,100,130, 50, 10, 60,150, 50, 3
0, 70, 90
 910 DATA 150, 90, 90, 30, 70,10
0, 70, 90, 50, 30, 70,150, 90, 3
0,100, 90
 920 DATA 100, 70, 90, 50, 70, 4
0, 70, 70, 50, 50, 70,150, 90, 5
0,130,150
 930 DATA  70, 50, 90,100,130,15
0,100, 30, 50,100, 80,100, 90,10
0,150,150
 940 DATA 100, 30, 90,130,150,15
0,140, 50, 50,150, 90,100, 90,13
0,120, 90
 950 DATA 140, 50, 50,130 150,10
0,150, 30,100,150,110,100, 50,13
0,140, 80
 960 DATA 150, 30, 50,150,150, 5
0,130, 10 130,150,120,100, 50,15
0,150, 60
 970 DATA 100, 10,150,150,150, 1
0, 90, 10,150,150,130,150,150,15
0,150, 50
 980 DATA  50, 30,150,130,130, 1
0, 60, 30,150,130,130,150,150,13
0,150, 40
 990 DATA  50, 70,110,130,130,10
0, 50, 60,130,130,140,150,110,13
0,140, 20
1000 DATA 100, 90,110,100,130,12
0, 50,100,100,130,150,150,110,10
0, 80, 10
1010 DATA 130,110,110, 50, 70, 1
0, 60,130, 70,130,150,150,110, 5
0, 50, 10
1020 DATA 100,130,110, 30, 50, 1
0, 90,150, 70,100,110, 10,110, 3
0, 50, 50
1030 DATA  60,110,150, 30, 50, 5
0,130,150, 70, 50, 90, 10,150, 3
0, 50,100
1040 DATA   0,  0,  0,  0,  0,
0,  0,  0,  0,  0,100, 50,  0,
0, 70, 70
1050 DATA   0,  0,  0,  0,  0,
0,  0,  0,  0,  0, 90, 80,  0,
0,130, 50
1060 DATA   0,  0,  0,  0,  0,
0,  0,  0,  0,  0,110, 80,  0,
0, 70, 30
1070 DATA 0,1,1,2,2,3,3,4,4,5,5,
6,6,7,7,8,8,9,9,10
1080 DATA 10,11,11,12,12,13,13,1
4,14,15,15,0
1090 DATA 16,17,17,18,18,16
1100:
1110 REM ** Machine code load ro
utine
1120 LET loc=45056
1130 LET check=0
1140 CLS : PRINT AT 10,10;"PLEAS
E WAIT"
1150 RESTORE 1230
1160 READ n
1170 IF n>=0 THEN  POKE loc,n: L
ET loc=loc+1: LET check=check+n:
 GO TO 1160
1180 IF check=29989 THEN  RETURN

1190 PRINT "Checksum is ";check;
"."
1200 PRINT "Should be    29989."
1210 PRINT "Check program and re
run."
1220 STOP
1230 DATA 0,0,0,0,0,0,0,0
1240 DATA 0,0,0,0,0,0,0,0
1250 DATA 0,0,0,0,0,0,0,0
1260 DATA  58, 18,176
1270 DATA  42,  8,176
1280 DATA  34, 14,176
1290 DATA  42, 10,176
1300 DATA  34, 16,176,245
1310 DATA 205, 68,176
1320 DATA  42, 12,176
1330 DATA  34, 16,176
1340 DATA 205, 68,176
1350 DATA  42, 14,176, 35
1360 DATA  35, 34, 14,176
1370 DATA 241, 61, 32,225
1380 DATA 205,238,176,201
1390:
1400 DATA 237, 91, 14,176
1410 DATA  26,203, 39, 22
1420 DATA   0, 95
1430 DATA  42, 16,176, 25
1440 DATA  70, 35, 78,197
1450 DATA 237, 91, 14,176
1460 DATA  19, 26,203, 39
1470 DATA  22,  0, 95
1480 DATA  42, 16,176, 25
1490 DATA  70, 35, 78,225
1500 DATA 205,109,176,201
1510:
1520 DATA 197,205,199,176
1530 DATA 193, 17,  1,  1
1540 DATA 120,148, 48,  4
1550 DATA  21, 21,237, 68
1560 DATA  71,121,149
1570 DATA  48,  4, 29, 29
1580 DATA 237, 68, 79,176
1590 DATA 200,121,184,229
1600 DATA  98,107
1610 DATA  34,  4,176
1620 DATA  46,  0, 56,  4
1630 DATA 101,107, 72, 71
1640 DATA  34,  6,176
1650 DATA  96,120,203, 63
1660 DATA 111,125,129
1670 DATA  56,  3,184
1680 DATA  56,  8,144,111
1690 DATA 237, 91,  4,176
1700 DATA  24,  5,111
1710 DATA 237, 91,  6,176
1720 DATA 227,124,130,103
1730 DATA 125,131,111,197
1740 DATA 205,199,176,193
1750 DATA 227, 37, 32,220
1760 DATA 225,201
1770:
1780 DATA 125,230,192
1790 DATA  31, 55, 31
1800 DATA  15,173,230,248
1810 DATA 173, 87,124,  7
1820 DATA   7,  7,173
1830 DATA 230,199,173,  7
1840 DATA   7, 95,124
1850 DATA 230,  7, 71,  4
1860 DATA  62,254, 15
1870 DATA  16,253, 71, 26
1880 DATA 168, 47, 18,201
1890 DATA  58, 19,176
1900 DATA 245,245, 61,203
1910 DATA  39, 22,  0, 95
1920 DATA  42, 12,176, 25
1930 DATA 126, 42, 10,176
1940 DATA  25,119, 19
1950 DATA  42, 12,176, 25
1960 DATA 126, 42, 10,176
1970 DATA  25,119,241, 61
1980 DATA  27,213, 95
1990 DATA  58, 23,176
2000 DATA  33,  0,  0
2010 DATA   6,  8, 41, 23
2020 DATA  48,  1, 25
2030 DATA  16,249,237, 91
2040 DATA  20,176, 25,237
2050 DATA  91, 22,176
2060 DATA  22,  0,203, 35
2070 DATA  25, 68, 77
2080 DATA  42, 12,176,209
2090 DATA  25, 10, 63,134
2100 DATA 119, 35,  3, 10
2110 DATA  63,134,119,241
2120 DATA  61, 32,172,201
2130 DATA -99 : REM ** Dummy end
 of data value
```

continued from page 78

shapes, simply hide some of the points along the lines joining the points in the new shape. Those will show up as tiny dots where the machine code performs OVER 1 plotting. That has been done in the demonstration data, because 16 points are needed for shapes such as 'S' and 'C' but far fewer for 'L'.

Then comes the number of shapes in the sequence — nothing complicated here.

The point coordinates themselves take up the most room. If we label the shapes s1,s2,s3,... and the coordinates (x1,y1),(x2,y2),(x3,y3),..., then the coordinates of the third point in the first shape would be s1(x3,y3). Based upon that notation, the data should be as follows: s1(x1,y1) , s2(x1,y1) , s3(x1,y1), ... , sn(x1,y1); s1(x2,y2) , s2(x2,y2) , s3(x2,y2) , ... , sn(x2,y2); and so on until s1(xp,yp) , s2(xp,yp) , s3(xp,yp) , ... , sn(xp,yp); where 'n' is the number of shapes and 'p' is the number of points.

Finally comes the data to inform the program which points are connected. It is not necessary to have the first point connected to the second, the second to the third, and so on, as long as the number of line data items is twice the number of lines given. One further note, the points are listed as: point 0 to point (number of points — 1) and not point 1 to point (number of points).

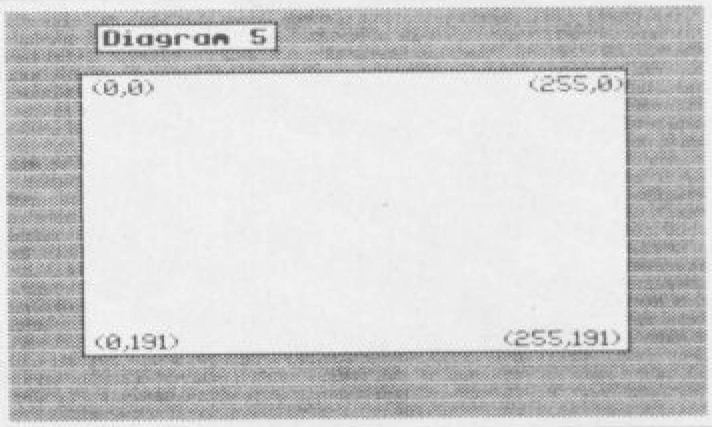
This sort of program is limited only by your imagination. A company title could suddenly transform into the company logo at the start of a title page, large wire-frame animation could be produced to show simple movies, or you could simply use it to draw pretty pictures. The more technically minded will no doubt want to alter and improve the program. One improvement which has already been mentioned is to implement floating-point arithmetic to ensure greater accuracy when transforming one picture to the next.

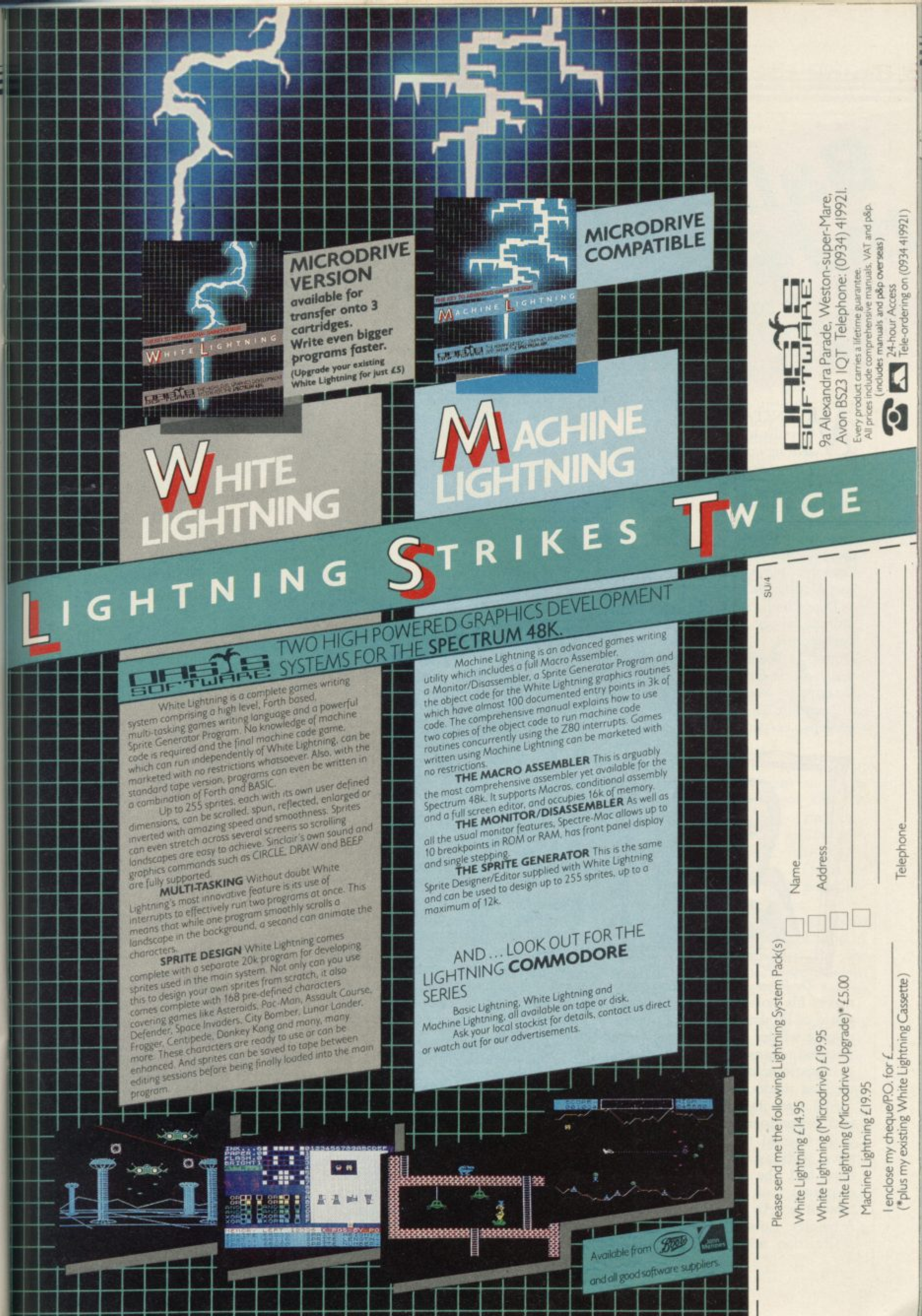
Another alteration which may appeal to some is to implement 'line transformation'. The routine described here produces 'point transformations', in that each point travels in a straight line to its new destination.

With line transformation, all the lines are of the same length in each shape. To move a line, its mid-point travels in a direct line to the mid-point in the new shape, and the gradient changes as it goes. That has the effect of moving the points from one shape to the next in an arc.

That is somewhat akin to the Channel 4 symbol, where all the lines remain the same length, and spin into their correct positions.

Diagram 5.





MICRODRIVE VERSION
available for transfer onto 3 cartridges.
Write even bigger programs faster.
(Upgrade your existing White Lightning for just £5)
MICRODRIVE COMPATIBLE
WHITE LIGHTNING
MACHINE LIGHTNING
LIGHTNING STRIKES TWICE
OASIS SOFTWARE
TWO HIGH POWERED GRAPHICS DEVELOPMENT SYSTEMS FOR THE SPECTRUM 48K.
White Lightning is a complete games writing system comprising a high level, Forth based, multi-tasking games writing language and a powerful Sprite Generator Program. No knowledge of machine code is required and the final machine code game, which can run independently of White Lightning, can be marketed with no restrictions whatsoever. Also, with the standard tape version, programs can even be written in a combination of Forth and BASIC.
Up to 255 sprites, each with its own user defined dimensions, can be scrolled, spun, reflected, enlarged or inverted with amazing speed and smoothness. Sprites can even stretch across several screens so scrolling landscapes are easy to achieve. Sinclair's own sound and graphics commands such as CIRCLE, DRAW and BEEP are fully supported.
MULTI-TASKING Without doubt White Lightning's most innovative feature is its use of interrupts to effectively run two programs at once. This means that while one program smoothly scrolls a landscape in the background, a second can animate the characters.
SPRITE DESIGN White Lightning comes complete with a separate 20k program for developing sprites used in the main system. Not only can you use this to design your own sprites from scratch, it also comes complete with 168 pre-defined characters covering games like Asteroids, Pac-Man, Assault Course, Defender, Space Invaders, City Bomber, Lunar Lander, Frogger, Centipede, Donkey Kong and many, many more. These characters are ready to use or can be enhanced. And sprites can be saved to tape between editing sessions before being finally loaded into the main program.
Machine Lightning is an advanced games writing utility which includes a full Macro Assembler, a Monitor/Disassembler, a Sprite Generator Program and the object code for the White Lightning graphics routines which have almost 100 documented entry points in 3k of code. The comprehensive manual explains how to use two copies of the object code to run machine code routines concurrently using the Z80 interrupts. Games written using Machine Lightning can be marketed with no restrictions.
THE MACRO ASSEMBLER This is arguably the most comprehensive assembler yet available for the Spectrum 48k. It supports Macros, conditional assembly and a full screen editor, and occupies 16k of memory.
THE MONITOR/DISASSEMBLER As well as all the usual monitor features, Spectre-Mac allows up to 10 breakpoints in ROM or RAM, has front panel display and single stepping.
THE SPRITE GENERATOR This is the same Sprite Designer/Editor supplied with White Lightning and can be used to design up to 255 sprites, up to a maximum of 12k.
AND ... LOOK OUT FOR THE LIGHTNING COMMODORE SERIES
Basic Lightning, White Lightning and Machine Lightning, all available on tape or disk. Ask your local stockist for details, contact us direct or watch out for our advertisements.
Available from Boots and all good software suppliers.
Please send me the following Lightning System Pack(s)
White Lightning £14.95
White Lightning (Microdrive) £19.95
White Lightning (Microdrive Upgrade)* £5.00
Machine Lightning £19.95
I enclose my cheque/P.O. for £
(*plus my existing White Lightning Cassette)
Name
Address
Telephone
SU4
OASIS SOFTWARE
9a Alexandra Parade, Weston-super-Mare, Avon BS23 1QT Telephone: (0934) 419921.
Every product carries a lifetime guarantee.
All prices include comprehensive manuals, VAT and p&p (includes manuals and p&p overseas)
24-hour Access Tele-ordering on (0934 419921)

Ballad of the Pi man

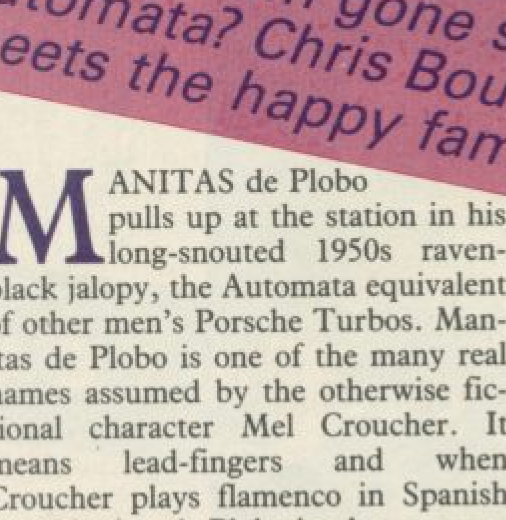
Has the dream gone sour on Automata? Chris Bourne meets the happy family



Mel Croucher and his little pink friend perform

MANITAS de Plobo pulls up at the station in his long-snouted 1950s raven-black jalopy, the Automata equivalent of other men's Porsche Turbos. Manitas de Plobo is one of the many real names assumed by the otherwise fictional character Mel Croucher. It means lead-fingers and when Croucher plays flamenco in Spanish bars Manitas de Plobo is what you get.

Take a look at Croucher as he drives through windy acres of dull drizzling Portsmouth to the warm haven of Dorothy's Wool Shop, heart of Automata and de facto embassy of Piland. He hunches over the wheel and begins to resemble Groucho himself, leaner perhaps, certainly quieter. Croucher



The Piman with his customary salute

makes his noise in the real world, a world of Pimaniacs and multitudes of singing whales swimming free in untroubled oceans. The rest of us live in a monstrous dream decked out in thrilling shades of grey.

Mel Croucher and Christian Penfold, his partner in spreading the word of Pi beyond the bounds of reality, were working together long before they had the fatal idea of selling computer software. Mel describes himself as "An architect. A musician. A painter. Lots of things."

Christian admits to having once been a used-car salesman.

"I also did plant hire. Have this lovely geranium. And I used to drive a TDC6 International Harvester. What a way to start life. I never went to school. I'm illegitimate."

He laughs, a sound to turn bone marrow into raspberry ripple. Or was it another demand for food from Lurch, the office parrot? At least, they think he's a parrot.

"That's why we're here," says Christian. "To feed Lurch. He gets really stroppy if you don't feed him."

In those bleak days before the coming of Pi the two met and moved into radio together. They produced a show for the Independent Radio Authority called *Whitbread Quiz Time*, the drinking man's answer to *Mastermind*. "And," says Mel, already getting bored with ancient and fictitious history, "We published for Sealink, British Airways, Intasun . . ." Travel guides. That was what Automata started as, a publishing company doing travel guides. Then it moved from travel guides to audio guides on cassette.

In late 1981 Automata Cartography created the unforgettable Portsmouth Tapes. "Hello there," begins the commentary, "And welcome aboard this pleasure cruise to the fascinating city of Portsmouth . . . Our journey will take about one hour and we'll be cruising at a speed of 1⅞in per second . . . my name is Charles Dickens . . ."

Automata the software house was born in the middle of the English Channel. "We were doing a guide for Sealink to the Channel Islands," says Mel. "Christian was putting the guide together, and I told him I had bought a ZX-81. He was totally scornful."

On the boat back the first program was written out on 20 sheets of paper. It was supposed to fit into 1K of RAM. "It was bloody great," says Mel. "It was a meeting of film and book."



Lady Clair, ravishing in green velcro

The first commercial programs were **Can of Worms** and **The Bible.** "Good family games with no violence

in the best of taste." And then came the Piman, and nothing was ever going to be the same again.

"We're very interested in artificial insemination," says Christian. "The Piman was not conceived in a test-tube but in a pint mug." Or, as Mel puts it, "He's very big Down Under."

The little pink tearaway with the vast proboscis made his first appearance in **Pimania,** the text adventure game which appeared in early 1983, with its quest for the golden sundial of Pi, which "really exists. We've got it in a bank somewhere all covered in assay marks. Nobody has cracked the puzzle yet but we bet they'll say Eureka! when they do . . ."

The Piman's rapidly developing ego was apparent even then. On side two of the cassette the infamous disco smash-hit-wallop **Pimania**, as recommended by leading South American torturers, began a series of musical statements which has led magazine reviewers of all ages to be very careful which side of an Automata game is put on the cassette deck first.

"You stole my deaf-aid and I want it back," were the Piman's first immortal words on tape. Or, as his inconstant companion Lady Clair Sinclive says, "Wow, a saxophone. I've always wanted to be in show-biz."

"**Pimania** is really a mirror of what we are," says Mel. "If you read the wonderful sales figures in the press it was 100,000. When we sold a thousand copies we thought bloody hell's teeth, this is wonderful. . . it struck a chord, obviously."

But greed transformed the happy family. For months Penfold and Croucher had been creaming vast profits off the business, paying themselves £24.49 a week and hiring extravagant trestle tables at ZX Microfairs.

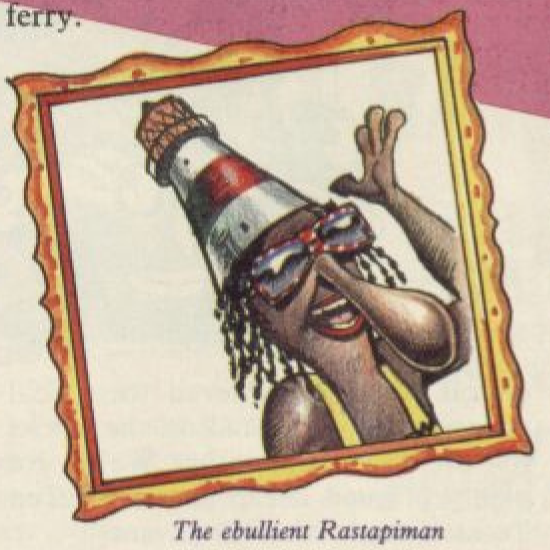
"We were mother and father to the Piman," says Mel. "We love all the little Pi-people. Morris, Rastapiman, Swettibitz — he's an intergalactic used-car salesman currently customising Rasta's C5. We were talking to Gremlin Evans the other day and he thinks their personalities are probably more rounded than ours." Gremlin Evans is the cartoonist responsible for the weekly comic strip published on the back page of Another Computer Magazine every week.

Penfold and Croucher apologise for the Piman not being present at the interview. But they insist that he is real. "You think he's one of us, don't you? But he's not. He exists."

Christian tells how a five-year-old boy telephoned and said his father had told him the Piman wasn't real. "I got the kid's father on the phone and had a go at him. I told him to stop breaking the kid's illusions. Then I told the boy to come along to the Microfair and bring his father along to meet the Piman. I want people to have trust in their software house."

Lady Clair, in whip-cracking form in her new role as a member of the Defect Police, takes time off from duplicating copies of **Deus Ex Machina** to bring more cups of coffee. "We're not sexist," says Mel. "If I were a skivvy I'd be making cups of coffee." Lady Clair snorts, and curls her thong.

As the afternoon lengthens the shadows of the present loom darker. Most of the games since **Pimania** have been programmed freelance, many arriving as unsolicited tapes which are then slotted into the Piman legend. **Pimania** itself was written by Christian, but designed by the two of them together. Mel's ambitions to fit 20 page programs onto the ZX-81 died on the ferry.



The ebullient Rastapiman

Between the launch of **Pimania** and the creation of the ill-fated and incredible **Deus ex Machina** the company became known for its espousal of non-violent game concepts, weird cartoons, surreal appearances at ZX Microfairs, and increasingly vocal opposition to what Penfold and Croucher see as the depredations of the middlemen, software distributors and retailers, on the industy.

Automata has always been essentially a mail-order business, and insists that wholesalers pay for what they buy when they order it, the same as other customers.

"We have to instil into people's brains that Automata cherishes its mail-order customers," says Christian. "When you buy something mail-



Dartz-loving Ooncle Arthur

order you put a cheque in the envelope and you know you are going to be charged. Wholesalers are reluctant to say 'We want a product. We will sit down and write a cheque.' "

Penfold and Croucher have been bitterly disillusioned by the lack of response to **Deus ex Machina**. Deus is an epic 'computer movie', a game/film/LP with stars like Ian Dury and Jon Pertwee on a synchronised music sound-track. It was written and largely performed by Mel and traces the life of a biological accident in a futuristic machine-world governed by defect police and propaganda. It received excellent reviews in the computer press and was taken up by the national media. Mel was interviewed by Barry Norman; the *Sunday Times* put it top of its list of games to buy for Christmas. Wholesalers treated it as if it were a plague-carrier.

"Deus truly was the first original audio-visual entertainment since the computer revolution," says Mel. "It didn't come from a bunch of programmers. It was treated like a film, with story-boards painted with felt-tip pens from beginning to end. Then the programmers said, 'it isn't possible.' Six months later it was done."

Everything except the lead vocals was mixed in Dorothy's Wool Shop. A London studio was hired for the vocals at great expense. One incident involved Jon Pertwee, former scarecrow and Time Lord.

"The studio was costing x pounds a minute," says Christian, "and Pertwee was late. He phoned after half-an-hour and said 'Terribly sorry dear boy, I'm going to be late.' I thought that was very arrogant. Then an hour late he walked in wearing a crash helmet and leathers and said 'I've just fallen off my Harley-Davidson.' He was bruised all down one side, but he went into the recording booth with his script and did the job."

continued on page 84

continued from page 83

So Deus was launched, the game of the movie of the record of the poster, to enormous acclaim. And Christmas came and went, and by the second week of February only 5,000 copies had been sold to major wholesalers.

Christian, becoming increasingly bitter as the afternoon wears on, explodes in quiet fury on his friend's behalf. "I am tone-deaf," he says. "I can understand the concept but I cannot follow it all. For Mel it was the crescendo of an idea, an emotional achievement. On my side, I have been flattened by the lack of response and sales despite the wonderful things said about it. I sit here and feel heart-broken at the pathetic way the wholesalers have handled it.

"I really wonder whether it's all worthwhile. Mel is a creative genius. He put more in and took more out of the Spectrum than anybody has done before.

"But because of our company policy of a fair deal for all, wholesalers have not put it into the shops. It was a wonderful idea, and beautifully packaged, and to be treated in the way it has been . . ."

Suddenly it is an ugly, bitter world. The Piman, who stole in to take part in the photo-session, sits on Mel's desk idly picking at a tape deck with his screwdriver. Christian's voice sinks lower. "My part is to try and get these bastards to part with some money. Our response to mail-order has proved people want it. The wholesalers could not have asked for more backup.

"We play by honourable rules. But



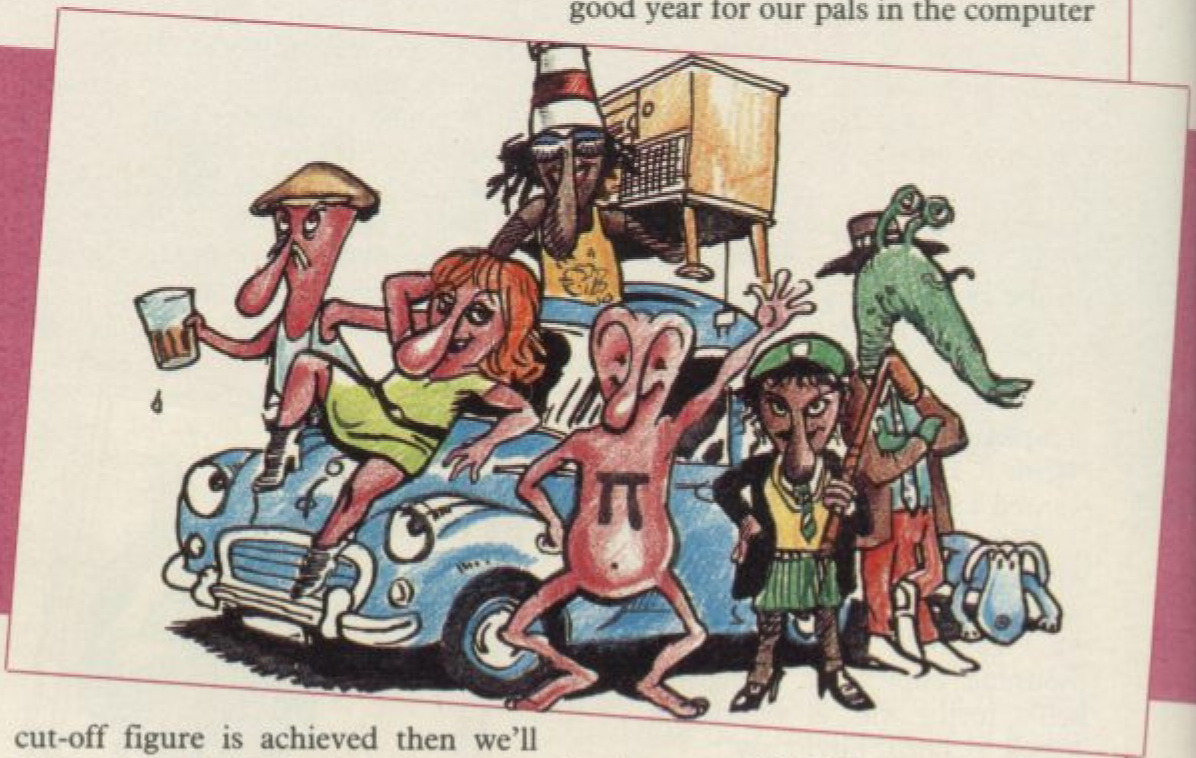
Lady Clair's daughter Piana

Pimania has not been through any major wholesaler. Thorn EMI, Microdealer, Lightning, Websters . . . they have not handled **Pimania.**"

The Piman looks up from his tape-deck and says, sadly, "You think it's fun, being a bit of a cult, trying to spend your time spreading joy and happiness through the planet? It's lonely in here you know, waiting for human contact and the opportunity to shine for an hour or two."

Plans for the future? Well, the Piman has already decided to release the first **Ten Pack,** ten Piman games for £10.00 on a single cassette. And Automata has reduced the price of Deus from £15.00 to £10.00 in disgust. "Why give the discount to the wholesalers if they won't buy enough copies to justify it? We're giving the discount to the public.

"What is the point of doing another one — another six months of my life?" asks Mel. "We are still waiting for the public to pick up on Deus. If the



cut-off figure is achieved then we'll release what we've had on the stocks for the last six months. We've got plenty of good cheap games for Ten Packs if that's what they want."

Even Lurch seems depressed. He hasn't moved for forty minutes. Christian, sounding anything but, says, "We do it for the bloody love of it. We don't work here. We just come in for fifteen hours a day. We do it for the people who buy mail-order, and for those letters from the kids. We are fortunate that Mel's wife and my young lady are good wage-earners."

Time to go, to trust life and limb to Mel's old black buggy. Croucher and Penfold apologise for the lack of jokes and jollity.

Lady Clair manages a smile. But the final words should go to the Piman, last champion of a world which should be real but somehow gets lost in all the sweat and tears of business. Here's his Christmas message, as heard on *The*



Swettibitz, intergalactic salesman

Piman's Greatest Hits Too, available mail order from etc etc.

"Hello everybody, especially Pimaniacs . . . another year older, but no wiser I fear . . . all in all, not a very good year for our pals in the computer business was it? Talk about bankrupt stock . . . here's to absent friends (hic). We weren't in competition you know. Still, what with software piracy, or should I say Theft of Software by all of you out there . . . what did you expect?

"Then there's all those stupid advertising rates . . . think of a number, double it, add your telephone number . . .

"And what with wholesalers taking 50 or 60 percent and not wishing to part with their pennies for several weeks . . . (hic)

"Goodbye. Goodbye to all the 87 software houses who are no longer with us . . . hello multinationals with your contract lawyers and your cut-price rotten little programs . . .

"Goodbye everybody . . . "

. . .

END OF TAPE . . .

. . .

(hic)

Tasprint sets the style

The new extension to Tasword II adds variety to the appearance of the text

IF YOU use your Spectrum for writing letters or preparing drafts then there is a very good chance that you use **Tasword II**, the best-selling word processor from Tasman Software. If in addition you also use a dot matrix printer then Tasman's latest offering is for you.

Tasprint is a program which can be used with your own programs or merged with Tasword. It extends the capabilities of your printer to give an extra five character types — fonts. Of those five you will probably only want to use three; Median and Lectura Light are both fonts which could be used for business letters, while Compacta is ideal for sections which need to stand out.

Palace Script is described as distinctive and flowing, though I find that it highlights the deficiencies of dot matrix printers. The fifth, Data-Run, looks like a refugee from the bottom of a cheque book with letters which cannot make up their mind whether they wish to be thick or thin.

In addition to the five extra fonts **Tasprint** enables you to underline, box and print inversely white letters on black backgrounds. Those extra facilities have been paid for by having to use letters which are twice the normal height.

While the manual is adequate to merge **Tasprint** with **Tasword II**, it is unclear in some parts. True to form Tasman also includes in the manual a section of technical details to allow you to make the most of the program. If there are any faults in the way the program works then they lie, firstly, with the fact that the control codes — instructions to the printer shown as graphics characters on the screen — are interpreted as spaces when printing and, secondly, with not being able to change fonts in the middle of a line. That first drawback can be compensated for and there are very few occasions when you would actually want to use different fonts in one line.

Although the gain from adding such facilities can be great it must be remembered that they replace the Tasword option to define the graphics characters as printer control codes.

The brochure which Tasman is currently including with its products is printed using **Tasword II** and **Tasprint** and is an excellent illustration of the quality which can be achieved. In the past few months there have been a couple of pretenders to Tasman's place as the producer of the best word processor for the Spectrum. The addition of **Tasprint** must surely put Tasman firmly back in the lead.

Tasman Software, 17 Hartley Cresent, Leeds LS6 2LL.

Mike Wright

TASPRINT
Tasman Software
Memory: **48K**
Price: **£9.90**
Gilbert Factor: **8**

This is printed normally in Tasword II but if I change to
Lectura Light then it looks like this, while
Median looks like this
Compacta looks like this
DATA RUN IS LIKE THIS AND FINALLY
for those long flowing letters we have Palace Script and with
any of these can be used underlining boxing , or even
inverse printing

The silicon banker looks into the future

Keep your accounts in order and then get a projection for future balances. But can the banker beat his rivals?

BANKER from Andic Software is a program which can be used not only to keep track of, but also to forecast, future balances in your bank account. It works on the simple idea that every transaction can be thought of as a standing order, even if it is a one-off. Such orders can then be applied to the balance in an account for future months and so forecast the balance in the account.

The orders are set up with the usual details of description, type, amount and date — year, month and days. In addition the period, or number of months, of the order can be specified.

In order that the best use can be made of the program the manual suggests that around 50 or 60 orders be set up, including one for expecting the 'unanticipated expense'. Once the details have been set up they are updated onto the 'Order file', and then amended or deleted with ease. With payments being noted by a minus sign one of the nice features of the program is the provision for changing the sign of an amount by pressing the 'j' key.

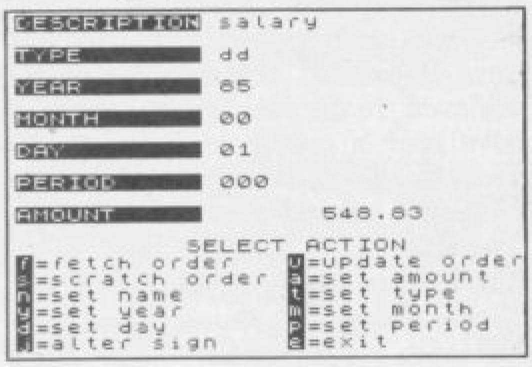
Modelling the account for future income and expenditure is done simply by specifying the starting date for the modelling, the balance in the account and the length of the model in months. The amount of output, which

continued on page 88

continued from page 87

can be printed either on screen only or on the printer only, is controlled by the level and graph options. The Level can be set to 1 — monthly summaries only; 2 — summaries also showing amended daily balances only; or 3 — summaries and full details of all transactions.

In addition you can also have a line graph for each month showing the daily closing balances — option one — or a bar chart of daily balances for the whole period — option two — or both together — option three. Alternatively you need have no graphs at all. Since the line graphs have no scale and the



Banker

bar chart, which is printed sideways, is lengthy, that is probably the best option to use.

The manual, six photocopied A4 sheets, is well written and makes using the program relatively easy. However, Andic's claim that **Banker** is "one of the few genuinely useful and practical" programs available for the Spectrum is way off target. If you want the program to keep track of individual items of expenditure it can be done but the printout is cluttered and difficult to read. You would soon run out of space with a maximum of 200 orders.

My main dislike of the program is that the modelling is linear — only the standing orders as they are set up are applied. There is no easy way of allowing for, say, a five percent pay or RPI increase in the model. **Finance Manager** from OCP will keep track of your accounts more efficiently and easily. It can also be used for modelling in the same way as **Banker.** The only thing it does not do is draw the graphs.

Andic Software 17 Gypsy Lane, Marlow, Buckinghamshire.

Mike Wright

BANKER
Andic Software
Memory: **48K**
Price: **£8.50**
Gilbert Factor: **5**

How do you rate for personality power?

Can the Lifeline test add to your self-knowledge? Mike Wright doubts it

IF YOU are about to take on a new employee or branch out into a new job yourself then **Lifeline,** a self-analysis and career counselling program from William Stuart Systems could be what you are looking for. Written by a psychologist it is designed to highlight a person's particular strengths and on the basis of these give a character analysis.

Lifeline will run on either a 16K or 48K Spectrum. For your money you get the program, the plastic presentation box and a 13 page booklet. The booklet is a vital part of the package as it is used to give pen pictures of the main personality characteristics.

The program is easy to use and once you have entered your name and read the introduction page you are off. **Lifeline** is in two stages. The first is a question and answer session followed by the analysis. The session consists of 24 sets of four words. For each set you are asked to select which word is most like you and which is least like you. Even if you think that none of them are appropriate the choice must still be made. Your choice is made by pressing keys 1 to 4.

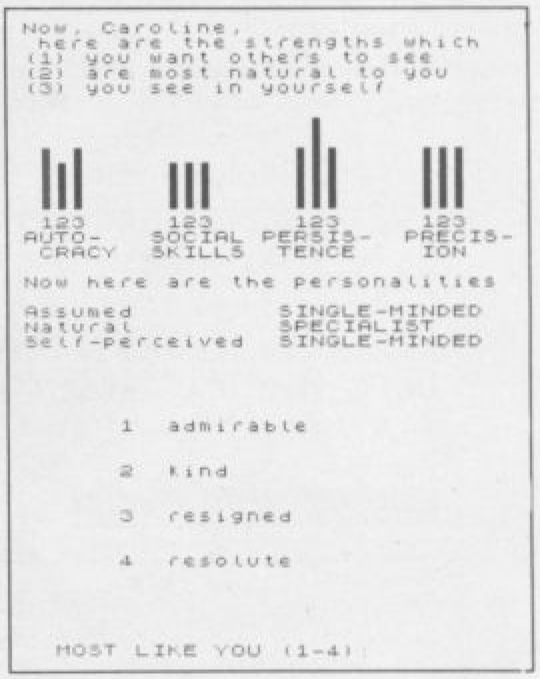
Once the selections have been made the program matches the responses to its inbuilt character types before displaying the results. It takes about a minute before that is completed and you can sit down with the booklet and work out where your strengths lie.

The results take the form of a series of bar charts which show relative strengths for four main characteristics. These are autocracy, social skills, persistence and precision. For each characteristic three bars are used to show the strength of the projected, the true and the self-perceived. Finally, a personality type is given for each of the three personalities with a choice to copy the screen to the printer. The printing option is intended for use with a ZX printer or other that supports the COPY command, although it was not too difficult to break into the program and change it to work with a full-sized printer.

In the first section the booklet lists the main tendencies of high characteristics, followed by advice on which occupational areas you may do well in. The second section explains the personality types, and includes advice on more specific occupations which are suited to that type.

In all sections the advice is very general and consists of the obvious; for example, "Convincer . . . . . ability to use friendly persuasion to get others to move in your direction. Sales and Marketing . . . . . suit you well."

This program could have a place in careers counselling and personnel work. Written 'tests' like this are



Lifeline

already used. I feel however, that results from computer 'tests' are likely to be less accurate because fear of computers, which is still prevalent in the vast majority of this country's workforce, will lead to a lack of seriousness and bias the results.

William Stuart Systems, Quarley Down House, Cholderton, Nr Salisbury, Wiltshire SP4 0DZ.

Mike Wright

LIFELINE
William Stuart
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Price: **£14.95**
Gilbert Factor: **4**

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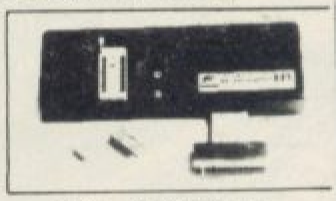
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```
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              EPROM TYPE  — 27128
         RAM START ADDR   — 4000
          EPROM ST ADDR   — 0000
             JOB LENGTH   — 4000
                   TASK   — CHECK

        WHICH TASK DO YOU WISH TO DO
W) CHECK THAT EPROM IS CLEAN
X) READ THE CONTENTS OF EPROM INTO
   RAM
Y) BLOW AN EPROM WITH DATA FROM
   RAM
Z) VERIFY THAT EPROM DATA IS THE SAME
   AS IN RAM
Q TO QUIT                 R TO RESTART
— — — — — — — —
          FAST CODES AVAILABLE
   D        H       PQR        WXYZ
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BOEING 747

In the last part of an investigation into the software industry, Clare Edgeley talks to the distributors

Trapped in a software vice



SOFTWARE HOUSES are falling into the hands of liquidators like there's no tomorrow — and in many cases there isn't. They do not know where the money for their next game is coming from, and when they do produce a game there is a high chance that it won't even reach the public. They blame the distributors — the middlemen in the industry — for creating this climate.

The distributors claim the fault is not theirs. They, too, are suffering cash flow problems and those problems are irritated by delayed programs, cancelled launch dates, limited shelf space in shops and poor quality games. They are caught in a vice with the software houses on one side and retail outlets on the other.

It is the distributors' job to evaluate the games sent by the software houses and then sell the best into as many shops as possible. Shelf space in shops is limited for the huge number of games available and so distributors can choose only a small number for their catalogues. John Forrest from Thorn EMI explains, "We are selling into an amount of space so we have to decide what game is going to move fastest", and adds, "the retailer can't evaluate and order from dozens of small publishers — he wants to buy from as few suppliers as possible." The same can be said of the software houses — they do not have the resources to contact each shop separately.

However, the job the distributor has to perform is not as cut and dried as buying from one area of the market and selling to another.

Last Christmas, the high point of the seasonal market, distributors were inundated with software to evaluate. Loretta Cohen, from Lightning Records & Video, distributors, explains that they couldn't cope with the number of games coming in for evaluation. "We experienced a lot of rudeness from software houses about the evaluations — but the volume was almost too much. If they sat on this side of the fence. . . "

If, as John Forrest suggests, software houses had presented the games earlier in the year, some companies would have succeeded in winning one of those much prized places on the shop shelves.

Distributors are very cautious about the games they take on as each game constitutes a risk and the gamble is in choosing the one piece of software which will sell better than others of the same ilk. If a mistake is made the shops will not buy and the distributor is left with unwanted software on his hands.

Clive Digby-Jones, of Websters, states, "In the past software houses sent us a tape and expected us to send an order in advance. We are now at a point where we see a product and try it out on people first." That attitude is shared by most distributors. One recent exception concerned Legend's **The Great Space Race.**

Months before release, adverts for the game littered the computer press warning of its impending arrival. "**The Great Space Race** was hyped to such an extent that demand for the product was coming in from the public before the stores had got the game", reveals Loretta Cohen. "The retailers phoned us and we didn't have it as Legend kept changing the launch date. Demand was so great we had to order copies without seeing the game. It hasn't sold. We won't ever take on a game without first seeing it".

Terry Blood Distribution also got its fingers burnt in this incident and Joe Wood sums up, "It is assumed that distributors manipulate the market, but in fact it is probably the other way round and the market manipulates the distributors. The market dictates — if the software produced is of poor quality it won't sell, no matter how many copies are bought by the distributors and sold to retailers".

Before last Christmas, Websters received around 400 games a month and from that number chose 50 — a frightening waste of time and effort on the part of the software houses. "We look at a game and decide if it is a copy and whether a game similar to it is doing well. If that is the case there is no point in removing it to make way for another of the same", says Clive Digby-Jones.

The rapidly decreasing number of software houses is also a cause for concern. It has been pointed out that one of the reasons behind the demise of many software houses is the huge discounts they have to give the distributors on their games — as much as 60 percent in some cases — and the long payment terms when those games have been accepted — up to 45 days.

It is true that those terms are creating cashflow problems for small software houses, yet the blame cannot be laid at the distributors' door alone.

On that issue the distributors are caught firmly in the middle. The retailers demand a discount of up to 40 percent when taking on a game. The distributor needs payment for handling that game and will ask for a



Illustration: Graham Ward

discount of between 50-60 percent from the software houses, keeping only 15-20 percent.

Those margins have to be met. As Joe Wood puts it, "If the margins on a game aren't sufficient it won't get into a distributor".

A similar situation arises with payment terms. "We pay 30 days from the end of the month after receipt of goods — that is, on average, 45 days", explains John Forrest, "We buy and sell on those terms".

Automata's **Deus Ex Machina** is an example of the failure of this system; — the game has been widely acclaimed and yet Automata experienced great difficulty in getting it into the shops. Automata insisted on payment when the distributors' orders were placed, and consequently many distributors refused to handle the program as they would be out of pocket while waiting to be paid by the retailers. Of course, the system as it exists means that the software publishers are often out of pocket while they wait to be paid by the distributors.

As there is no standard discount, the software houses are able to negotiate terms on each game. John Forrest states, "If the retailer is taking a larger volume he can sometimes demand a larger discount. If the publisher has a fantastic product he might suggest a lower margin because of the greater quantities sold".

The packaging of a game can be one of the deciding factors in its selection to a distributor's catalogue. Games in cassette-sized packaging tend to stand a better chance of being chosen than a similar game in a large library-style case. Though the larger case is certainly more eye-catching, some retailers are loath to take such products when they could display two or three smaller ones in the same space.

Andrew Denning of Lazer Distribution agrees, "I've seen it happen, retailers take fewer copies of a game when they find out the size of the packaging." However, Adrian Fisher from Tiger Distribution disagrees, "So long as a game's packaged well, we haven't refused to take less because of its size. Games packaged well, sell well and with a good retailer it shouldn't stop a library-case packaged game getting onto the shop shelves".

Nevertheless, games do suffer from unweildy large packaging and software houses must take that into consideration, and realise that far from gaining more visual coverage, they might even get less.

Distributors are more business conscious now that the industry is going through a shake-up than they were two years ago. The market is carefully evaluated and different ranges of games are sold into different sectors. Clive Digby-Jones explains Websters' policy, "We have the responsibility to pick the best sellers first and tailor our range to fit different customer bases. For example, Boots is a predominantly female store relying on family purchases and is more likely to take on a range of best sellers. Their range differs from newsagents who will take on the budget ranges, others will take only chart toppers. We try to meet the needs of each outlet".

Loretta Cohen adds, "We don't encourage the shops to order large numbers of games — in that way they should never be embarrassed with overstock. If we feel they are ordering too much we'll tell them".

All are agreed that they would like to see a standard release date from each company — as in the record business. Tiger's Adrian Fisher comments, "Launch dates which have been moved around cause a problem when selling into the shops."

When the games industry started four years ago, there were few distributors in evidence and business was mostly by mail order. As computer games increased in popularity, large chain stores like W. H. Smith and Boots entered the market. Small, independent computer shops sprouted and suddenly distributors were necessary. Andrew Denning of Lazer points out, "Some businesses wouldn't exist if they weren't with us as very small retailers demand about five of each product and software houses, like Ultimate, wouldn't be able to cope with small orders like that".

Briefly, then, the system works for some and not for others. Whether it is the best system in the circumstances is arguable, and something that the months and years ahead might decide. At the very least, it allows publishers, distributors and retailers to lay the blame for occasional blunders at each other's doors.

One last point — did you notice how often you, the customer, figured in the arguments detailed in this article? Why not add your still small voice to the debate by writing to *Sinclair User* with your opinions on the marketing of software? We look forward to hearing from you.

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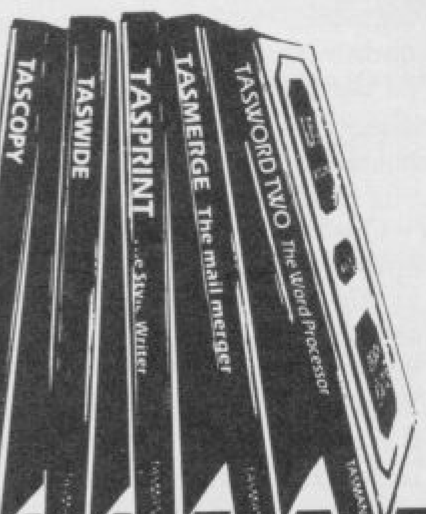
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EXIT leave DO-LOOP
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DEC hexadecimal to decimal
DPEEK double PEEK
FILLED filled area
HEX$ decimal to hexadecimal
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MEM free memory
MEMORY$ all of memory as a string
MOD modules
NUMBER 2 characters to number
OR (bit-by-bit)
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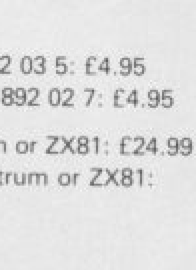
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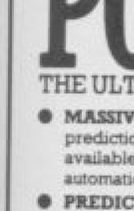
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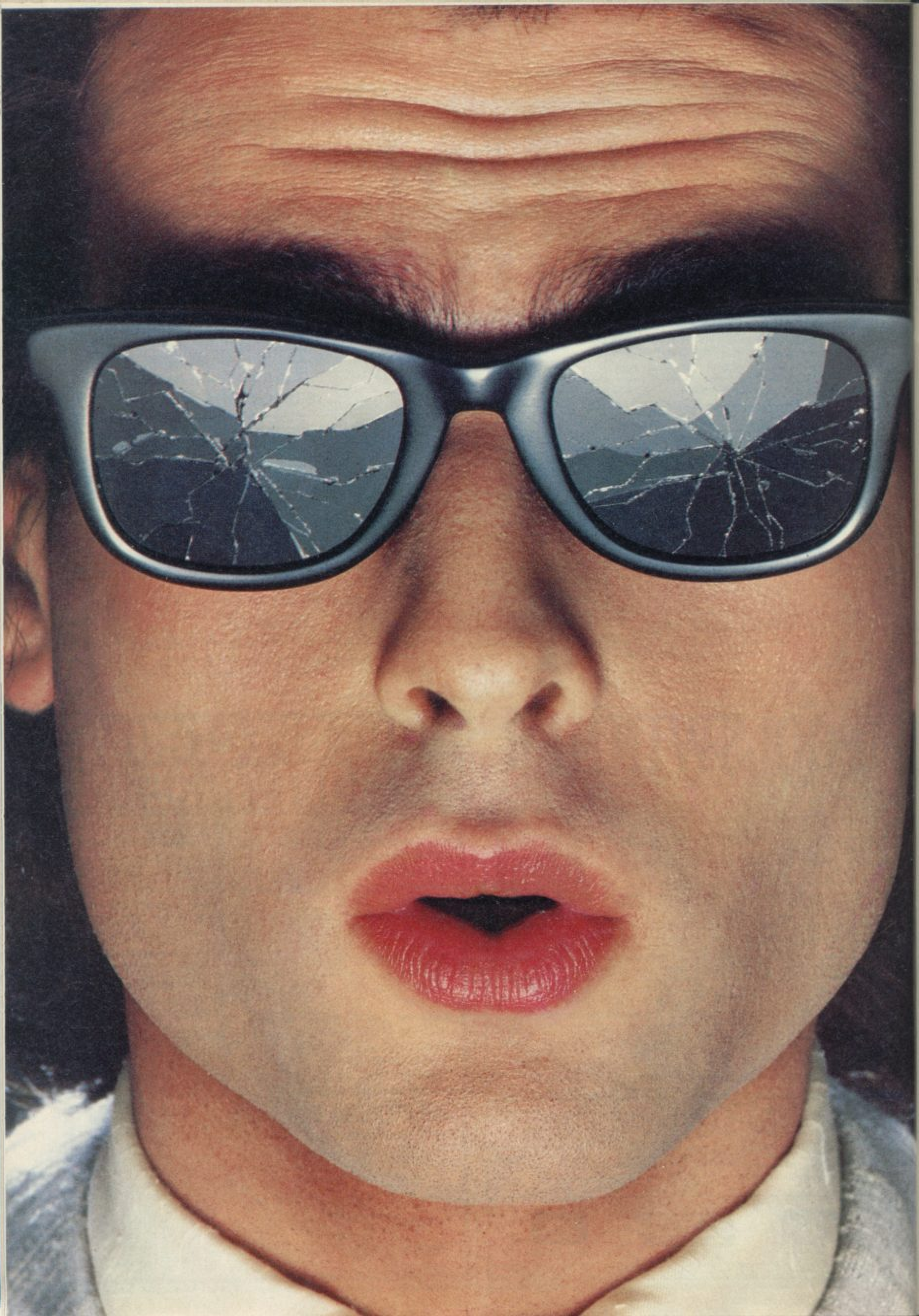
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PROGRAM PRINTOUT

GRAPHICS INSTRUCTIONS

IN GENERAL, graphics abbreviations are enclosed in brackets, which should not be entered. A string of the same graphics character is represented in the form (3*A) which would be entered as AAA, where A is the graphics character. A space, where it is important to have the correct number of spaces, is indicated by (sp). Spaces in text will not normally be indicated. Where several graphics characters are used, they are separated by commas, which should not be entered. With Spectrum and QL listings the letter I has a flat top and the numeral 1 has a sloping top.

The above applies to all Sinclair machines. The following instructions are for specific machines.

ZX-81: ZX-81 listings are generally reproduced as they appear when you enter them, spaces and all. Where extensive graphics are used, REM statements will be inserted to provide a guide to the position of each character.

Spectrum: User-defined graphics are represented by underlined letters, without brackets. Type the appropriate letter while in graphics mode. The underline does not appear on the screen. Inverse characters have the letter i before them, e.g. iZ, iA, iP. Block graphic characters are indicated by g followed by the number of the appropriate key: g4 would mean the block graphics on key 4, ig4 the inverse of that graphic.

Control codes are indicated by cc before the character, and are obtained by pressing CAPS SHIFT while in extended mode. They do not appear on the screen but may change the colour of the cursor and will affect what is printed after them: cc3,i* would thus have the effect of printing an inverse asterisk in red.

QL: User-defined graphics on the QL are indicated by a description of the keys pressed to obtain them, underlined and in brackets. Thus (CTRL + 9) means press CTRL and 9 together. The same applies for unusual characters within the QL character set, which our printer is unable to reproduce.



CITY DEFENCE

DEFEND the citizens of your planet against invading aliens in **City Defence** by Robert Eva of Truro in Cornwall. Wave upon wave of enemy craft must be destroyed before you get the chance to enter Hyperdrive and defeat the foe in space itself.

City Defence uses substantial machine-code routines, and you must therefore take great care when entering the DATA statements at the beginning. Full instructions are included within the game which runs on any 48K Spectrum.

City Defence uses our special abbreviations for graphics characters, so please read the instructions above before typing in the program.

```
  10 FOR f=65368 TO 65535: READ
a: POKE f,a: NEXT f
  20 DATA 24,24,255,255,189,189,
255,255
  30 DATA 0,248,216,255,223,253,
223,255
  40 DATA 0,0,0,0,0,0,85,255
  50 DATA 0,0,3,15,63,255,255,25
5
  60 DATA 60,60,255,255,85,255,8
5,255
  70 DATA 0,0,3,15,13,63,53,255
  80 DATA 0,255,129,255,129,255,
129,255
  90 DATA 255,255,165,255,165,25
5,165,255
 100 DATA 16,16,16,16,16,19,255,
255
 110 DATA 0,0,0,7,31,149,255,255
 120 DATA 231,255,165,231,165,23
1,165,255
 130 DATA 24,60,24,60,24,255,255
,255
 140 DATA 0,24,24,60,255,219,255
,255
 150 DATA 0,15,15,13,253,255,181
,255
 160 DATA 0,224,248,168,248,168,
255,170
 170 DATA 0,0,48,48,38,62,62,255
 180 DATA 0,0,0,118,84,126,76,78
 190 DATA 254,97,255,255,127,121
,112,255
 200 DATA 224,248,156,135,254,24
0,0,128
 210 DATA 0,7,30,252,31,7,0,3
 220 DATA 192,240,62,126,252,188
,14,255
 300 CLEAR 39999: FOR f=40000 TO
 40737: READ a: POKE f,a: NEXT f
 305 DATA 17,224,255,58,80,195,1
11,58,81,195,103,6,8,26,119,19,3
6,16,250,58,80,195,60,111,58,81,
195,103,6,8,26,119,19,36,16,250
 310 DATA 6,2,197,22,64,33,0,0,1
22,50,107,156,14,20,203,38,48,2,
14,0,35,6,31,203,38,48,3,43,52,3
5,35,16,246,43,121,254,10,48,1,5
2,122,60,87,122,254,72,32,213,62
,32,50,106,156,193,16,201,62,0,5
0,106,156
 320 DATA 33,49,64,17,31,80,6,8,
126,254,128,56,15,197,62,170,6,8
,18,20,16,252,6,8,21,16,253,193,
36,123,30,32,131,95,16,228
 330 DATA 33,17,64,17,30,72,6,8,
126,254,127,56,29,197,229,33,240
,255,6,8,126,18,20,35,16,250,6,8
,21,16,253,28,6,8,126,18,20,35,1
6,250,225,193,36,123,30,32,131,9
5,16,213
 350 DATA 33,244,1,17,1,0,6,19,2
29,213,197,205,181,3,193,209,225
,43,43,16,243
 400 DATA 17,120,195,58,80,195,1
11,58,81,195,103,6,8,26,119,19,3
6,16,250,58,80,195,60,111,58,81,
195,103,6,8,26,119,19,36,16,250
 550 DATA 33,1,72,6,128,197,6,31
,126,43,119,35,35,16,249,43,54,0
,35,35,193,16,238
 570 DATA 58,80,195,60,111,58,81
,195,103,126,254,0,40,6,62,255,5
0,96,234,201,24,3,0,0,0
 571 DATA 33,0,72,6,8,126,254,0,
32,9,125,46,32,133,111,16,244,24
```



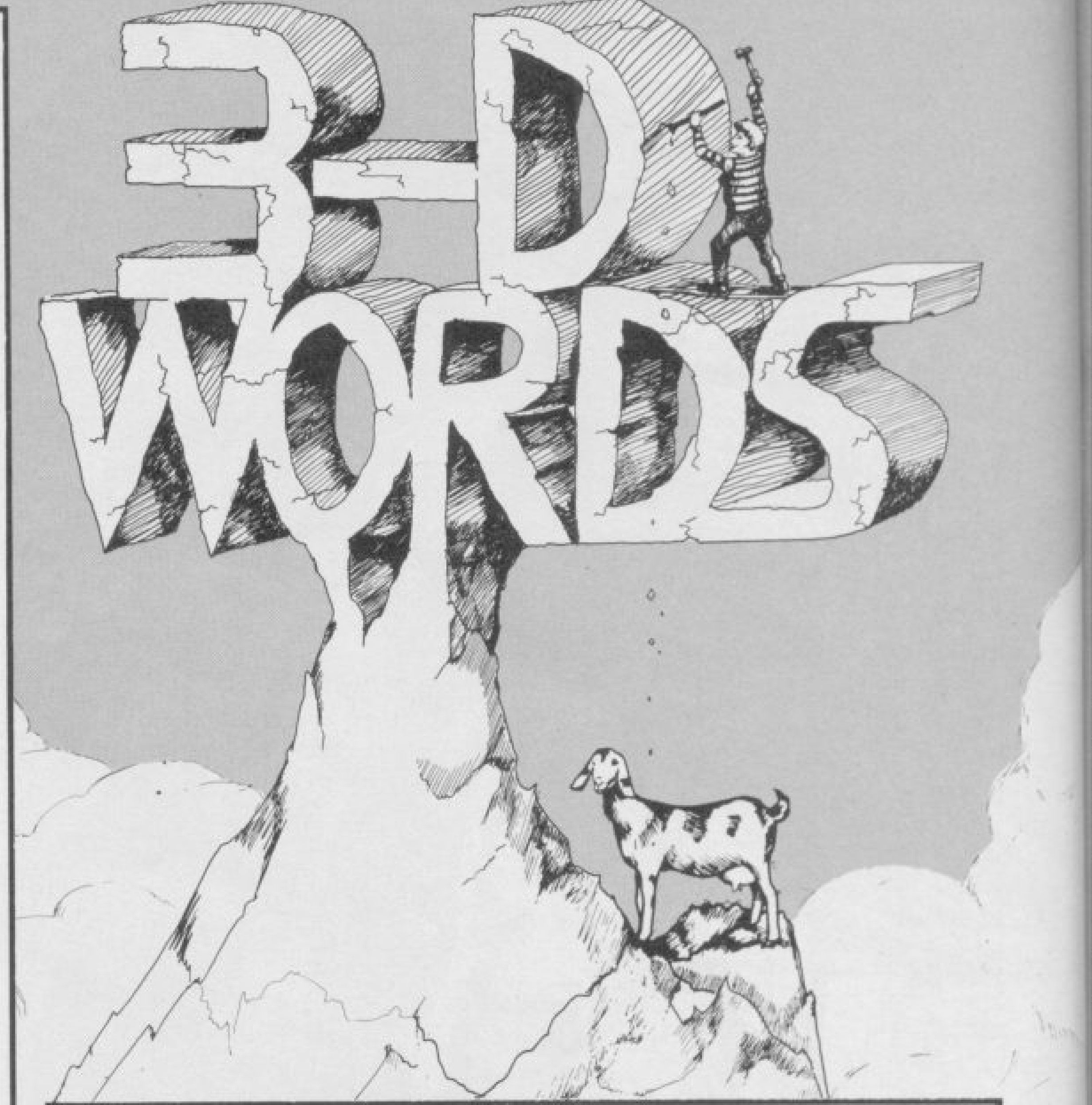
```
,23,58,84,195,61,50,84,195,254,0
,32,6,62,255,50,96,234,201,198,4
7,215,62,8,215
 573 DATA 205,191,2,254,255,202,
64,156
 574 DATA 58,85,195,254,0,40,56
 575 DATA 205,191,2,254,79,32,49
,58,85,195,61,50,85,195,33,0,72,
6,128,197,6,32,126,254,170,40,2,
54,255,35,16,246,193,16,240,33,0
,72,6,128,197,6,32,126,254,170,4
0,2,54,0,35,16,246,193,16,240
 590 DATA 205,191,2,254,65,32,38
,58,81,195,254,80,40,20,58,80,19
5,254,224,32,13,62,0,50,80,195,6
2,80,50,81,195,195,64,156,58,80,
195,198,32,50,80,195,195,64,156
 600 DATA 205,191,2,254,81,32,46
,58,81,195,254,72,32,19,58,80,19
5,254,0,202,64,156,58,80,195,222
,32,50,80,195,195,64,156,58,80,1
95,254,0,32,241,62,224,50,80,195
,62,72,50,81,195,195,64,156
 610 DATA 205,191,2,254,80,40,34
,195,64,156
 620 DATA 17,1,0,33,64,156,6,75,
77,126,237,121,38,0,111,229,213,
197,205,181,3,193,209,225,38,136
,105,44,16,234,201
 625 DATA 33,0,0,17,1,0,6,110,22
9,213,197,205,181,3,193,209,225,
35,16,244
 630 DATA 58,80,195,60,60,111,58
,81,195,60,60,60,103,6,30,126,25
4,0,32,37,54,85,35,16,246,1,0,15
,11,120,254,0,32,250,58,80,195,6
0,60,111,58,81,195,60,60,60,103,
6,30,54,0,35,16,251,195,64,156
 640 DATA 205,61,158,58,80,195,6
0,60,111,58,81,195,60,60,60,103,
6,30,126,254,85,32,5,54,0,35,16,
246,58,81,195,254,80,202,64,156
 650 DATA 37,37,37,6,8,54,0,36,1
6,251,6,8,37,16,253,44,6,8,54,0,
36,16,251,58,80,195,87,14,0,33,1
3,64,6,8,121,186,40,7,14,32,129,
79,36,16,245,126,254,0,32,3,44,2
4,248,203,38,48,252
 655 DATA 58,83,195,61,200,50,83
,195,195,64,156
 660 DATA 33,0,64,6,192,197,6,32
,203,62,35,16,251,193,16,245,201
 700 LET H$="---": LET H=0
 715 POKE 65528,192: POKE 50000,
0: POKE 50001,0: POKE 40183,24:
POKE 40184,19: POKE 40263,201: P
OKE 60000,0: BORDER 0: PAPER 0:
INK 6: CLS
 720 POKE 40037,2: POKE 40244,12
8
 730 PRINT AT 2,10; BRIGHT 1; IN
K 4;"CITY DEFENCE"
 770 PRINT AT 4,0; INK 3;"Up....
...[q]";AT 4,20; INK 4;"Down....
.[a]";AT 5,0; INK 5;"Fire.....[p
]";AT 5,20; INK 7;"Smart....[o]"
 780 PRINT AT 1,0; INK 0;"CITY D
EFENCE--by--R.EVA 1984--"
 785 FOR f=0 TO 25: PLOT  INK 0;
INT (RND*256),INT (RND*7)+168: N
EXT f
 786 PRINT  INK 7; BRIGHT 1;'"RS
  Press any key to begin    TU"
 790 RANDOMIZE USR 40000
 800 IF INKEY$="" THEN  GO TO 79
0
 801 FOR F=0 TO 12: RANDOMIZE US
R 3583: RANDOMIZE USR 40509: NEX
T F
 802 POKE 40183,33: POKE 40184,2
44: PRINT AT 21,0; INK 6; BRIGHT
 1;"INSTUCTIONS ? (y/n)"
 804 LET a$=INKEY$: IF a$="" THE
N  GO TO 804
 806 IF a$="Y" OR a$="y" THEN  G
O SUB 2500: GO TO 810
 808 IF a$<>"n" AND a$<>"N" THEN
  GO TO 804
 810 POKE 40263,58: PRINT AT 21,
21; INK 4;"NO": FOR F=1 TO 3: RA
NDOMIZE USR 40509: RANDOMIZE USR
 3583: NEXT F
 830 PRINT AT 21,0; INK 7; BRIGH
T 1;"Level 1  OR 2...."
 840 LET A$=INKEY$: IF A$="" THE
N  GO TO 840
 850 IF A$="1" THEN  PRINT AT 21
,21; INK 4;"LEVEL:1": LET W=5: L
ET X=1: LET Y=2: LET Z=7: POKE 6
5520,0: GO TO 875
 860 IF A$="2" THEN  PRINT AT 21
,21; INK 4;"LEVEL:2": LET W=0: L
ET X=0: LET Y=0: LET Z=0: POKE 6
5520,1: GO TO 875
 870 GO TO 840
 875 FOR F=1 TO 4: RANDOMIZE USR
 40509: RANDOMIZE USR 3583: NEXT
 F: PRINT  INK 7; BRIGHT 1;AT 20
,0;"P=PRACTICE OTHER-(15*sp)WISE
 ANY OTHER KEY"
 877 IF INKEY$<>"" THEN  GO TO 8
77
 880 IF INKEY$="" THEN  GO TO 88
0
 890 IF INKEY$="1" THEN  POKE 65
520,0: POKE 65528,0: PRINT AT 21
,21; INK 4;"PRACTICE": GO TO 950
 900 PRINT AT 21,21; INK 4; BRIG
HT 1;"REAL"
 950 FOR F=1 TO 4: RANDOMIZE USR
 40509: RANDOMIZE USR 3583: NEXT
 F: PRINT #0; INK 5; BRIGHT 1;TA
B 5;" #PRESS 'S' TO BEGIN #"
 960 IF INKEY$<>"" THEN  GO TO 9
50
 970 IF INKEY$<>"S" THEN  GO TO
970
 980 FOR F=0 TO 23: RANDOMIZE US
R 40509: RANDOMIZE USR 3582: NEX
T F
1000 LET J=0: LET SO=0
1005 LET L=3: POKE 50005,5: LET
V=20: POKE 40190,19
1008 POKE 23658,255: POKE 50003,
V+1: IF J<>1 AND PEEK 65528<>0 T
HEN  PRINT AT 3,23; INK 4;"SCREE
N "; FLASH 1; BRIGHT 1;V/4-4: GO
 TO 1020
1009 IF PEEK 65528<>0 THEN  PRIN
T AT 3,22; FLASH 1;"HYPERSPACE":
 GO TO 1020
1010 PRINT AT 3,24; FLASH 1;"PRA
CTISE"
1020 PLOT 0,159: DRAW 255,0: PLO
T 0,158: DRAW 255,0: PLOT 0,114:
 DRAW 255,0: PLOT 0,115: DRAW 25
5,0: PLOT 0,116: DRAW 255,0
1030 INK W: IF J=0 THEN  FOR f=0
 TO 31: PRINT AT 1,f;CHR$ (INT (
RND*16)+144): NEXT f
1040 FOR f=0 TO V: LET A=INT (RN
D*256): LET B=INT (RND*256)
1042 LET A=INT (RND*256): LET B=
INT (RND*8)+168
1045 IF POINT (A,B)=1 OR POINT (
A,B-1)=1 THEN  GO TO 1042
1050 PLOT A,B: NEXT F: INK 6
1060 FOR f=0 TO 1: PRINT AT f,0;
```



```
 INK W; PAPER X; BRIGHT 1; OVER
1;"(32*sp)";AT f,13; PAPER Y; IN
K Z;"(4*sp)": NEXT f
1070 PRINT AT 6,0; INK 7; BRIGHT
1;"Score ";SO
1080 FOR F=8 TO 15: PRINT AT F,2
; INK INT (RND*6)+2; PAPER 0;"(3
0*sp)": NEXT F
1090 PRINT AT 6,12; INK 3;"Hi-sc
ore "; INK 4;H; INK 5;" by "; IN
K 0; PAPER 3;H$
1100 POKE 50004,6: POKE 50000,96
: POKE 50001,72: PRINT AT 3,0;"(
9*sp)": PRINT AT 11,0;"(5*sp)":
PRINT AT 3,0; INK 2; BRIGHT 1;"R
S RS RS "( TO L*3): PRINT AT 3,1
1; INK 7; BRIGHT 1;"PASS-5";CHR$
8;: LET mc=USR 40000: IF PEEK 6
0000<>255 THEN GO TO 2000
1110 POKE 60000,0: POKE 40723,72
: POKE 40725,128: FOR f=0 TO 7:
LET MC=USR 40509: LET MC=USR 407
21: NEXT F: POKE 40723,64: POKE
40725,192
1115 PAUSE 60
1120 LET L=L-1: IF L>0 THEN GO
TO 1100
1130 PRINT AT 10,9; INK 5; BRIGH
T 1;"--GAME OVER--"; INK 4; PAPE
R 1;'''"(3*sp)Press any key to r
e-start(4*sp)"
1140 IF INKEY$<>"" THEN GO TO 1
140
1150 IF INKEY$="" THEN GO TO 11
50
```

```
1160 IF SO<H THEN GO TO 1190
1170 POKE 40263,58: INPUT "Initi
als (max 3 characters) "; LINE N
$
1180 IF LEN N$>3 THEN LET N$=N$
( TO 3)
1190 LET J=0: POKE 40244,128: PO
KE 40037,2: GO TO 715
2000 FOR F=0 TO 6: LET MC=USR 40
721: LET MC=USR 40509: NEXT F: C
LS : LET V=V+4: LET S=PEEK 40190
: LET S=S-2
2005 IF INKEY$="X" THEN GO TO 7
15
2010 IF S<=0 AND J=1 THEN POKE
40183,24: POKE 40184,19: LET S=1
2020 IF V>=60 THEN LET V=8: LET
J=1: POKE 40037,1: POKE 40244,6
4: LET L=3: LET S=PEEK 50005: LE
T S=S+1: POKE 50005,S: LET S=25
2040 POKE 40190,S
2045 IF PEEK 65528=0 THEN GO TO
1008
2050 LET SO=SO+(L+PEEK 50005*10+
(50-S))*(J+1)
2060 GO TO 1008
2500 CLS : RANDOMIZE USR 40509
2510 PLOT 0,159: DRAW 255,0: PLO
T 0,158: DRAW 255,0: PLOT 0,114:
 DRAW 255,0: PLOT 0,115: DRAW 25
5,0: PLOT 0,116: DRAW 255,0
2520 FOR f=0 TO 31: PRINT AT 1,f
;CHR$ (INT (RND*16)+144): NEXT f
2530 FOR f=0 TO 20: LET A=INT (R
ND*256): LET B=INT (RND*8)+167:
```

```
PLOT A,B: NEXT F
2540 FOR f=0 TO 1: PRINT AT f,0;
 INK 5; PAPER 1; BRIGHT 1; OVER
1;"(32*sp)";AT f,13; PAPER 2; IN
K 7;"(4*sp)": NEXT f
2550 PRINT AT 3,20; FLASH 1;"INS
TRUCTIONS";AT 3,11; FLASH 0;"PAS
S-5"
2560 PRINT AT 3,0; INK 2;"RS RS
RS"
2565 LET L$="(9*sp)#REPORT START
#": GO SUB 3000
2570 LET L$="WARNING-RED ALERT-D
ANGER AREA:-   :CITY OF THRAAL:"
: GO SUB 3000
2580 LET L$="UNIDENTIFIED FLYING
 VEHICLES    REPORTED SIGHTED FR
OM VARIOUS   LOCATIONS AROUND CI
TY...NUMEROUSSHOT DEAD...": GO S
UB 3000
2590 LET L$="COMMANDING OFFICER.
.DO YOUR BEST": GO SUB 3000: LET
 L$="         #REPORT END#"
2600 GO SUB 3000: LET L$="": GO
SUB 3000
2610 LET L$="   BRIEF FLYING INS
TRUCTIONS     ": GO SUB 3000
2620 LET L$="             SCANNER
             ": GO SUB 3000
2630 LET L$="SHOWS POSITIONS OF
BUILDINGS &  ALIENS.PATCH OF CON
TRASTING COL-OUR IN CENTRE SHOWS
 SCREEN AREA VISIBLE.DOTS SHOW A
LIENS....": GO SUB 3000
2640 LET L$="              LASER
             ": GO SUB 3000
2650 LET L$="OPERATED USING KEY
'P':UNLIMITEDPOWER:DESTROYS OUTR
IGHT AN ALIENIN ITS DIRECT PATH.
...": GO SUB 3000
2660 LET L$="           SMART BOMB
             ": GO SUB 3000
2670 LET L$="OPERATED USING KEY
'O':LIMITED  TO 5:USE SPARINGLY-
AS LAST RES- ORT ONLY.DESTROYS A
NY ALIEN ON  SCREEN - NOT ON SCA
NNER -": GO SUB 3000
2675 LET L$=""
2680 LET L$="AFTER 10 WAVES OF P
ROGRESSIVE   DIFFICULTY,YOU WILL
 ENTER HYPER-SPACE:THE FULL MIGH
T OF THE     ALIEN EMPIRE IS NOW
 UNBOUNDED BYTHE FORCES OF GRAVI
TY AND SPEED UP CONSIDERABLY.THE
 BUILDINGS   WILL NOT APPEAR..."
: GO SUB 3000
2685 LET L$=""
2690 LET L$="THE PASS NUMBER IS
DECREASED BY THE CURRENT LEVEL E
VERY TIME AN ALIEN SLIPS BY YOUR
SHIP IF IT  DECREASES PAST ZERO
A LIFE WILL BE LOST...": GO SUB
3000
2695 LET L$=""
2700 LET L$="AVOID CRASHING INTO
 THE CITY,   AGAIN-YOU WILL LOSE
 A LIFE...": GO SUB 3000
2710 LET L$=""
2800 LET L$="WHEN YOUR 3 LIFES H
AVE BEEN LOSTTHE GAME IS OVER.HO
WEVER ENTER- ING HYPERSPACE REPL
ENISHES YOUR STORE AND IT WILL R
ETURN TO 3...": GO SUB 3000
2900 LET L$="": GO SUB 3000
3000 LET A=1: LET C=0: FOR F=1 T
O LEN L$
3010 PRINT AT 21,C;L$(A): RANDOM
IZE USR 40509: LET A=A+1: LET C=
C+1
3020 IF C<=31 THEN NEXT F
3030 RANDOMIZE USR 3583: LET C=0
: NEXT F
3040 FOR F=1 TO 4: RANDOMIZE USR
 3583: RANDOMIZE USR 40509: NEXT
 F: RETURN
9998 STOP
9999 CLEAR : SAVE "CITY" LINE 1:
 RUN
```



3D WORDS is a comprehensive program to design and print display lettering on any Spectrum. Written by John Hunton of Whitely Bay in Tyne and Wear, it converts phrases into 3D lettering in the colour and size of your choice.

The program can be saved by entering GOTO 700 after typing it in. There are facilities to SAVE and LOAD SCREEN$ so you can work on previous displays or add lettering to your own pictures to make attractive title pages or even commercial shop window displays.

The program uses our special abbreviations for the graphics characters, so please read the instructions on the first page of Program Printout before entering the listing.

```
   2 RANDOMIZE
   3 BORDER 7: PAPER 7: INK 0: C
LS
   4 PRINT AT 10,12;"3D WORDS"
   5 PRINT AT 21,4;"PRESS SPACE
TO CONTINUE"
   6 RANDOMIZE USR 1316
   8 POKE 23609,30
   9 BORDER 7: PAPER 7: INK 0: C
LS
  10 PRINT AT 0,10; INK 2; PAPER
 6;"MAIN MENU"
  11 PRINT AT 2,0;"1.Change Size
 of letter."
  12 PRINT "2.Instructions."
  13 PRINT "3.PRINT 3D Words."
  14 PRINT "4.LPRINT Menu."
  15 PRINT "5.NEW program."
  16 PRINT "6.LPRINT Instruction
s.": PRINT "7.LOAD """" SCREEN$
": PRINT AT 18,0;"Program is in
MEDIUM size letter
            mode."
  17 IF INKEY$="1" THEN  GO TO 3
00
  18 IF INKEY$="2" THEN  GO TO 2
00
  19 IF INKEY$="3" THEN  GO TO 4
5
  20 IF INKEY$="4" THEN  COPY :
GO TO 10
  21 IF INKEY$="5" THEN  STOP
  22 IF INKEY$="6" THEN  GO TO 2
00
  23 IF INKEY$="7" THEN  GO TO 6
00
  24 GO TO 17
  45 CLS
  50 PRINT '' PAPER 0; INK 7;AT
0,1;"Now please follow the promp
ts."
  64 PRINT AT 21,4; INK 7; PAPER
 2;"PRESS SPACE TO CONTINUE"
  65 RANDOMIZE USR 1316
  67 BORDER 7: PAPER 7: INK 0: C
LS
  70 CLS : FOR n=0 TO 10: BEEP .
02,n: NEXT n
  80 INPUT "Pixels from top((ig8
) =8 pixels)";p
  90 INPUT "Letters (7 max)   ";a
$: IF LEN a$>7 OR LEN a$<1 THEN
 BEEP 1,-30: GO TO 90
  91 INPUT "Colour (0-6)";p$
  92 IF p$="1" THEN  INK 1
  93 IF p$="2" THEN  INK 2
  94 IF p$="3" THEN  INK 3
  95 IF p$="4" THEN  INK 4
  96 IF p$="5" THEN  INK 5
  97 IF p$="6" THEN  INK 6
  98 IF p$="0" THEN  INK 0
  99 IF p$="7" THEN  INK 7: IF p
$>"7" OR p$<"0" THEN  GO TO 91
 100 LET a=LEN a$: PRINT  INK 7;
AT 21,0;a$: BEEP .1,1: BEEP .1,2
: BEEP .1,3: BEEP .1,4: BEEP .1,
5: BEEP .1,6
 110 FOR f=0 TO 8*a-1: FOR n=0 T
O 7
 120 IF POINT (f,n)=0 THEN  GO T
O 160
 130 PLOT f*4,n*4+135-p: DRAW 4,
0: DRAW 0,4: DRAW -4,0: DRAW 0,-
3: DRAW 3,0: DRAW 0,2: DRAW -2,0
: DRAW 0,-1: DRAW 2,0: DRAW -2,-
2
 140 DRAW 5,5: DRAW 0,4: DRAW 0,
-4: DRAW 4,0: DRAW 0,4: DRAW 0,-
4: DRAW -5,-5
 150 DRAW 0,4: DRAW 5,5: DRAW -4
,0: DRAW -5,-5
 160 NEXT n: NEXT f
 170 IF a$="3D WORD" THEN  PAUSE
 50: GO TO 40
 180 INPUT "Write some more ? (y
/n)";w$
 181 IF w$="n" THEN  GO TO 240
 182 IF w$="y" THEN  GO TO 185
 185 INPUT "Clear Screen ?";t$
 186 IF t$="y" OR t$="Y" THEN  C
LS : GO TO 80
 187 IF t$="n" OR T$="N" THEN  G
O TO 80
 188 GO TO 185
 200 CLS
 202 PRINT AT 0,0; INK 2; PAPER
6;"JOHN HUNTON     --     3D WOR
DS"
 204 PRINT AT 2,0;"This Program
allows you to "
 205 PRINT "generate 3D letters
on your "
 206 PRINT "Z.X.Spectrum."
 208 PRINT
 209 PRINT "First you must selec
t the size "
 210 PRINT "that you want your l
etters to be"
 211 PRINT "then type your lette
rs in and "
 212 PRINT "the computer will do
 the rest"
 213 PRINT
 215 PRINT ; INK 2;"Size 1 = Sma
ll  20 pixels high."
 216 PRINT ; INK 2;"Size 2 = Med
ium 30 pixels high."
 217 PRINT  INK 2;"Size 3 = Larg
e  40 pixels high."
 218 PRINT
 219 PRINT  INK 1;"Size 1 = 9 ch
aracters per line."
 220 PRINT  INK 1;"Size 2 = 7 ch
aracters per line."
 221 PRINT  INK 1;"Size 3 = 5 ch
aracters per line."
 223 PRINT AT 19,0; INK 4;"R=RET
URN     Z=COPY"
 224 IF INKEY$="r" OR INKEY$="R"
 THEN  RUN 10
 225 IF INKEY$="z" OR INKEY$="Z"
 THEN  PRINT AT 19,0;"(32*sp)":
COPY : GO TO 200
 226 GO TO 224
 240 BORDER 7: PAPER 7: INK 7:
 250 INPUT "Copy to Z.X.Printer?
";s$
 251 IF s$="y" OR s$="Y" THEN  G
O TO 260
 252 IF s$="n" THEN  GO TO 270
 260 INPUT "How Many Copies ?";a
$
 261 IF a$="1" THEN  COPY : GO T
O 180
```




```
 262 IF a$="2" THEN  COPY : COPY

 263 IF a$="3" THEN  COPY : COPY
 : COPY
 264 IF a$="4" THEN  COPY : COPY
 : COPY : COPY
 265 GO TO 270
 270 INPUT "Save SCREEN$ ?";a$
 271 IF a$="y" THEN  GO TO 273
 272 IF a$="n" THEN  GO TO 275
 273 SAVE "3D"SCREEN$
 275 INPUT "Return to Menu ?";w$
 276 IF w$="y" OR w$="Y" THEN  G
O TO 9
 277 IF w$="n" OR w$="N" THEN  G
O TO 180
 278 GO TO 275
 300 BORDER 7: PAPER 7: INK 0: C
LS
 301 PRINT AT 0,0; INK 2; PAPER
6;"JOHN HUNTON      -       3D WOR
DS"
 302 PRINT AT 2,0;"With this pro
gram you can "
 303 PRINT "have three different
 sizes of"
 304 PRINT "letters."
 305 PRINT
 306 PRINT "(Refer to Instructio
ns.)"
 307 PRINT
 308 PRINT  INK 2;"Enter Size Of
 Characters Require"
 309 PRINT
 310 PRINT  INK 4;"1.Small"
 311 PRINT  INK 4;"2.Medium"
 312 PRINT  INK 4;"3.Large"
 313 INPUT "Size 1,2 OR 3. ?";q$
 314 IF q$="1" THEN  CLS : GO TO
 400
 315 IF q$="2" THEN  CLS : GO TO
 45
 316 IF q$="3" THEN  CLS : GO TO
 500
 317 GO TO 313
 400 INPUT "Pixels from top ((ig
8)=8 pixels)";p
 402 INPUT "Letters (9 max)   ";a
$: IF LEN a$>9 OR LEN a$<1 THEN
 BEEP 1,-30: GO TO 402
 404 INPUT "Colour (0-6)";p$
 406 IF p$="1" THEN  INK 1
 407 IF p$="2" THEN  INK 2
 408 IF p$="3" THEN  INK 3
 409 IF p$="4" THEN  INK 4
 410 IF p$="5" THEN  INK 5
 411 IF p$="6" THEN  INK 6
 412 IF p$="0" THEN  INK 0
 413 IF p$="7" THEN  INK 7: IF p
$>"7" OR p$<"0" THEN  GO TO 404
 420 LET a=LEN a$: PRINT  INK 7;
AT 21,0;a$: BEEP .1,1: BEEP .1,2
: BEEP .1,3: BEEP .1,4: BEEP .1,
5: BEEP .1,6
 421 FOR f=0 TO 8*a-1: FOR n=0 T
O 7
 422 IF POINT (f,n)=0 THEN  GO T
O 430
 424 PLOT f*3.5,n*4+140-p: DRAW
4,0: DRAW 0,4: DRAW -4,0: DRAW 0
,-3: DRAW 3,0: DRAW 0,2: DRAW -2
,0: DRAW 0,-1: DRAW 2,0: DRAW -2
,-2
 426 DRAW 5,5: DRAW 0,4: DRAW 0,
-4: DRAW 4,0: DRAW 0,4: DRAW 0,-
4: DRAW -5,-5
 428 DRAW 0,4: DRAW 5,5: DRAW -4
,0: DRAW -5,-5
 430 NEXT n: NEXT f
 432 INPUT "Write Some More ? (y
/n)  ";w$
 433 IF w$="n" THEN  GO TO 445
 434 IF w$="y" THEN  GO TO 436
 436 INPUT "Clear screen ?";t$
 437 IF t$="y" OR t$="Y" THEN  C
LS : GO TO 400
 438 IF t$="n" OR t$="N" THEN  G
O TO 400
 439 GO TO 436
 440 CLS
 445 INPUT "Copy to Z.X.Printer?
";s$
 446 IF s$="y" OR s$="Y" THEN  G
O TO 448
 447 IF s$="n" THEN  GO TO 460
 448 INPUT "How Many Copies ?";a
$
 449 IF a$="1" THEN  COPY : GO T
O 180
 450 IF a$="2" THEN  COPY : COPY

 452 IF a$="3" THEN  COPY : COPY
 : COPY
 453 IF a$="4" THEN  COPY : COPY
 : COPY : COPY
 460 INPUT "Save SCREEN$  ?";a$
 461 IF a$="y" THEN  GO TO 465
 462 IF a$="n" THEN  GO TO 470
 465 SAVE "3D"SCREEN$
 470 INPUT "Return to Menu ? ";w
$
 471 IF w$="y" OR w$="Y" THEN  G
O TO 9
 472 IF w$="n" OR w$="N" THEN  G
O TO 432
 473 GO TO 470
 500 INPUT "Pixels from top ((ig
8)=8 pixels)";p
 502 INPUT "Letters (6 max)   ";a
$: IF LEN a$>6 OR LEN a$<1 THEN
 BEEP 1,-30: GO TO 90
 505 INPUT "Colour (0-6)";p$
 506 IF p$="1" THEN  INK 1
 507 IF p$="2" THEN  INK 2
 508 IF p$="3" THEN  INK 3
 509 IF p$="4" THEN  INK 4
 510 IF p$="5" THEN  INK 5
 511 IF p$="6" THEN  INK 6
 512 IF p$="0" THEN  INK 0
 513 IF p$="7" THEN  INK 7: IF p
$>"7" OR p$<"0" THEN  GO TO 505
 515 LET a=LEN a$: PRINT  INK 7;
AT 21,0;a$: BEEP .1,1: BEEP .1,2
: BEEP .1,3: BEEP .1,4: BEEP .1,
5: BEEP .1,6
 516 FOR f=0 TO 8*a-1: FOR n=0 T
O 7
 517 IF POINT (f,n)=0 THEN  GO T
O 522
 518 PLOT f*5,n*5+140-p: DRAW 4,
0: DRAW 0,4: DRAW -4,0: DRAW 0,-
3: DRAW 3,0: DRAW 0,2: DRAW -2,0
: DRAW 0,-1: DRAW 2,0: DRAW -2,-
2
 520 DRAW 5,5: DRAW 0,4: DRAW 0,
-4: DRAW 4,0: DRAW 0,4: DRAW 0,-
4: DRAW -5,-5
 521 DRAW 0,4: DRAW 5,5: DRAW -4
,0: DRAW -5,-5
 522 NEXT n: NEXT f
 523 IF a$="3D WORD" THEN  PAUSE
 50: GO TO 40
 525 INPUT "Write some more ? (y
/n)";w$
 526 IF w$="n" THEN  GO TO 535
 527 IF w$="y" THEN  GO TO 500
 530 INPUT "Clear screen (y/n)";
t$
 531 IF t$="y" OR t$="Y" THEN  C
LS : GO TO 500
 532 IF t$="n" OR t$="N" THEN  G
O TO 500
 533 GO TO 525
 535 INPUT "Copy to Z.X. Printer
 ?";s$
 536 IF s$="y" OR s$="Y" THEN  G
O TO 540
 537 IF s$="n" OR s$="N" THEN  G
O TO 550
 538 GO TO 535
 540 INPUT "How Many Copies ? ";
a$
 541 IF a$="1" THEN  COPY : GO T
O 550
 542 IF a$="2" THEN  COPY : COPY

 543 IF a$="3" THEN  COPY : COPY
 : COPY
 544 IF a$="4" THEN  COPY : COPY
 : COPY : COPY
 545 GO TO 540
 550 INPUT "Save SCREEN$ ? ";a$
 551 IF a$="y" THEN  SAVE "3D"SC
REEN$ : GO TO 560
 552 IF a$="n" THEN  GO TO 560
 553 GO TO 550
 560 INPUT "Return to Menu ? ";a
$
 561 IF a$="y" OR a$="Y" THEN  G
O TO 9
 562 IF a$="n" OR a$="n" THEN  G
O TO 525
 563 GO TO 560
 600 CLS : PRINT AT 0,3; INK 1;
PAPER 5;"SCORPIO SOFTWARE 3D WOR
DS"
 601 PRINT AT 3,0; INK 1; FLASH
1;"LOAD """" SCREEN$ MODE"
 602 PRINT AT 5,0;"Change to siz
e of print required"
 603 PRINT "then LOAD the SCREEN
$ you want"
 604 PRINT "to work on."
 605 PRINT AT 12,0; INK 2;"R=Ret
urn to menu  J=LOAD SCREEN$"
 606 IF INKEY$="r" OR INKEY$="R"
 THEN  GO TO 9
 607 IF INKEY$="J" OR INKEY$="j"
 THEN  CLS : LOAD ""SCREEN$ : BE
EP .1,0: GO TO 80
 608 GO TO 606
 700 SAVE "3D WORDS" LINE 1
 701 VERIFY "3D WORDS"
 702 RUN
```

THE BIG HEAT

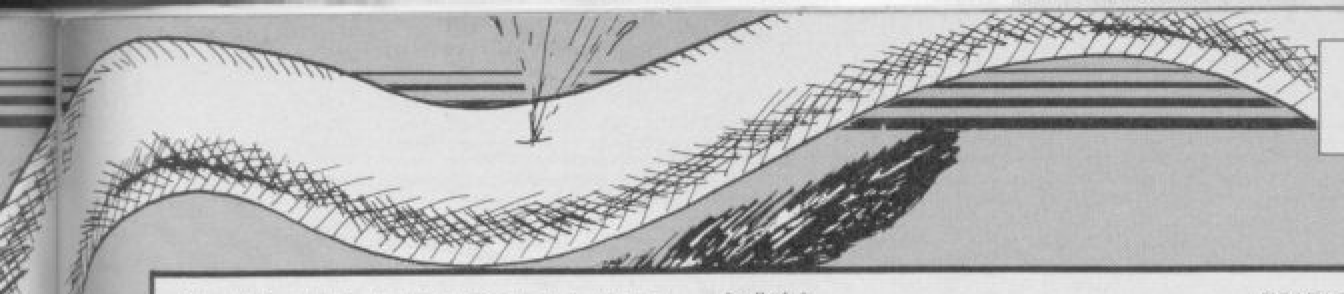


THE TEMPERATURE is rising down at the building site as Fred the fireman attempts to control the blaze. **The Big Heat** was written by Martin Kirkwood of Bexleyheath in Kent and runs on any Spectrum.

Freddy must jump up the platforms, avoiding the debris that tumbles down, to get the fire hose at the top. Then he goes along the conveyor belt, dodging the spider, to put out the fire at the bottom.

The Big Heat uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before typing in the program.

```
  10 LET hi=0
  15 LET sc=0: LET li=3: LET le=
1
  20 GO SUB 500: REM Intro
  30 GO SUB 1000: REM Initialise
  40 GO SUB 2000: REM Screen
  50 PRINT AT y2,x2;"(sp)";AT y2
-1,x2;"(sp)"
  55 IF INKEY$="s" THEN  GO TO 3
0
  60 PRINT AT y1,x1; INK 3;a$;AT
 y1-1,x1; INK 4;b$
  70 LET x2=x1: LET y2=y1
  71 PRINT AT s2,20;"(2*sp)";AT
s1,20;"UL"
  72 LET s2=s1: LET s1=s1+d: IF
s1>3 OR s1<1 THEN  LET d=-d
  80 LET x1=x1+(INKEY$="x")-(INK
EY$="z")
  86 IF INKEY$="(sp)" AND j=1 TH
EN  GO SUB 150: REM Jump
  90 IF x1>x2 THEN  LET b$="C":
LET a$="D": LET dir=1
 100 IF x1<x2 THEN  LET a$="B":
LET b$="A": LET dir=-1
 105 IF SCREEN$ (y1,x1)<>"(sp)"
THEN  LET x1=x2: LET y1=y2
 110 IF SCREEN$ (y1+1,x1)="(sp)"
 THEN  LET y1=y1+1: LET j=0: GO
TO 125
 115 IF x1<0 THEN  LET x1=0: IF
x1>31 THEN  LET x1=31
 120 LET j=1
 125 PRINT AT 21,6;"Score:";sc
 132 IF b<>0 THEN  GO TO 3500: R
EM Move ball (P)
 135 IF RND*25<=1 THEN  GO SUB 3
000
 137 IF x1=a AND y1=b THEN  GO T
O 4000: REM Hit by ball (P)
 140 IF x1=5 AND y1=4 THEN  GO T
O 5000: REM Stepped on conveyer
 belt
 142 IF y2>17 AND x2>27 THEN  GO
 TO 4000: REM Fell in fire
 145 GO TO 50
 149 REM Jump up through hole
 150 IF SCREEN$ (y1-2,x1)<>"(sp)
" THEN  GO TO 210
 155 LET x2=x1: LET y2=y1
 156 FOR f=1 TO 3
 160 PRINT AT y2,x2;"(sp)"
 170 PRINT AT y1,x1; INK 3;a$;AT
 y1-1,x1; INK 4;b$
 180 LET y2=y1: LET y1=y1-1
 185 BEEP .01,f*10
 190 NEXT f
 195 LET sc=sc+1
 200 LET x1=x1+dir
 205 IF x1<0 THEN  LET x1=0: IF
x1>31 THEN  LET x1=31
 210 RETURN
 499 REM Intro
 500 PAPER 0: BORDER 0: INK 7: C
LS
 510 PRINT "(4*K,sp,K,sp,3*K,2*s
p,4*K,sp,K,3*sp,K,2*sp,2*K,2*sp,
K,2*sp,2*K,4*sp,K,sp,K,2*sp,K,sp
,K,4*sp,2*K,sp,2*K,sp,K,2*sp,K,s
p,2*K,sp,2*K,4*sp,K,sp,3*K,2*sp,
3*K,2*sp,K,sp,K,sp,K,sp,4*K,sp,K
,sp,5*K,2*sp,K,sp,K,2*sp,K,sp,K,
4*sp,K,3*sp,K,sp,K,2*sp,K,sp,K,2
*sp,2*K,4*sp,K,sp,K,2*sp,K,sp,4*
K,sp,K,3*sp,K,sp,K,2*sp,K,sp,K,2
*sp,2*K,27*sp,K,2*sp,K)"
 520 PRINT '"(R,30*T,S)"
 530 PRINT ''"(sp)By(32*sp)M.KIR
KWOOD"
 550 PRINT '"(2*sp)CONTROLS ARE-
(33*sp)Z.........LEFT(18*sp)X...
.....,RIGHT(17*sp)'SPACE'....JUMP
"
 560 PRINT ''''"(3*sp)PRESS ANY
KEY TO CONTINUE"
 565 LET e=0
 570 RESTORE 6000: FOR f=1 TO 33
: READ p,d: BEEP d/80,(p-53)/4
 580 IF INKEY$<>"" THEN  LET f=3
3: LET e=1
 590 NEXT f
 595 PAUSE 10
 600 IF e=1 THEN  GO TO 620
 610 GO TO 570
 620 CLS
 630 PRINT TAB 12;"FIREMAN"
 640 PRINT '"(2*sp)You are Fredd
ie the fireman.Itis your job to
put out the fire at the bottom o
f the screen."
 650 PRINT '"(2*sp)You must get
to the top of thescreen to colle
ct the hosepipe. Watch out for t
he spider above(2*sp)the conveyo
r belt."
 660 PRINT '"(2*sp)Move Freddie
using...(25*sp)Z.........Left(18
*sp)X........Right(18*sp)'Space.
..Jump"
 670 PRINT AT 21,6;"Press Any Ke
y To Start"
 680 PAUSE 0
 690 RETURN
 999 REM Initialise
1000 RESTORE : FOR f=USR "a" TO
USR "u"+7
1010 READ a: POKE f,a
1020 NEXT f
1030 DATA 60,126,126,255,66,226,
20,116,28,42,107,235,106,60,200,
252
1040 DATA 60,126,126,255,66,71,4
0,46,56,84,214,215,86,60,19,63
1050 DATA 0,64,127,70,71,71,79,6
0,0,0,0,127,127,255,255,255,0,28
,8,156,159,252,220,192
1060 DATA 127,127,97,76,158,158,
12,0,255,255,254,252,253,253,0,0
,255,253,28,206,236,232,192,0
1070  DATA 0,249,249,249,0,159,1
59,159
1075 DATA 228,186,121,229,20,18,
10,8
1076 DATA 0,0,0,0,BIN 11000000,3
2,16,16,16,16,16,16,16,16,16,16
1077 DATA 16,16,8,7,0,0,0,0,0,0.
0,255,0,0,0,0,56,56,56,56,56,56,
56,16
1078 DATA 63,66,153,165,165,153.
66,63,252,66,153,165,165,153,66,
252,255,0,0,0.0,0,0,255
1079 DATA 39,93,150,167,40,72,80
,16
1080 LET z=0: LET x1=1: LET y1=1
9: LET x2=x1: LET y2=y1
1090 LET b=0: LET j=1: LET fuel=
```



```
0: LET a$="D": LET b$="C": LET d
ir=1
1100 POKE 23562,1: LET s1=1: LET
 s2=s1: LET d=le/10
1110 RETURN
2000 INK 2: PAPER 0: BORDER 0: C
LS
2005 PRINT AT 5,0: PAPER 6;"(5*K
)": INK 5; PAPER 0;AT 5,5;"(R,21
*I,S)"; PAPER 6; INK 2;"K"
2010 FOR f=8 TO 17 STEP 3: FOR g
=0 TO 28
2020 PRINT AT f,g: PAPER 6;"K"
2030 NEXT g
2040 NEXT f
2047 PRINT AT 2,0: PAPER 6;"(2*K
)"
2050 PRINT AT 0,0;"EFG";AT 1,0;"
HIJ"
2055 LET z=0
2060 FOR f=8 TO 17 STEP 3
2064 LET z1=z
2065 LET z=2+INT (RND*25)
2066 IF z1=z OR z1-z=1 OR z1-z=-
1 THEN  GO TO 2065
2070 PRINT AT f,z;"(2*sp)"
2080  NEXT f
2085 PRINT AT 5,0;"(2*sp)"
2090 FOR f=255 TO 237 STEP -1
2100 PLOT f,0
2120 DRAW  INK 2;0,RND*24
2130 NEXT f
2135 FOR f=237 TO 255: PLOT  INK
 6; OVER 1:f,RND*24: PLOT  OVER
1:f,RND*24: NEXT f
2140 PRINT  PAPER 6;AT 20,0:"(29
*K)";AT 21,0;"(29*K)"
2145 FOR f=1 TO li: PRINT AT 21,
f;"C": NEXT f: PRINT AT 21,20;"H
i:";hi
2200 RETURN
3000 LET a=0: LET a2=a: LET b=16
-(INT (RND*4)*3): LET b2=b
3010 PRINT AT b,a2;"(sp)";AT b,a
;"P"
3020 RETURN
3500 PRINT AT b2,a2;"(sp)";AT b,
a;"P": LET a2=a: LET b2=b: LET a
=a+1
3505 IF SCREEN$ (b+1,a)="(sp)" T
HEN  LET b=b+1
3510 IF a=28 THEN  PRINT AT b2,a
2;"(sp)": LET b=0: GO TO 137
3515 IF SCREEN$ (b+1,a)="(sp)" T
HEN  LET b=b+1
3520 GO TO 137
4000 BEEP 1,4: BEEP 1,-4
4010 LET li=li-1: IF li=0 THEN
GO TO 4030
4020 GO TO 30
4030 PRINT AT 10,10; FLASH 1; IN
K 5; PAPER 2:"Game Over"
4035 RESTORE 4070
4040 FOR f=1 TO 11
4050 READ p,d: BEEP d/40,(p-53)/
4
4060 NEXT f
4070 DATA 41,30,41,20,41,10,41,3
0,53,20,49,10,49,20,41,10,41,20,
37,20,41,40
4080 IF sc>hi THEN  LET hi=sc: P
RINT AT 15,9;"N E W   H I": FOR
f=1 TO 10: FOR g=1 TO 10: BEEP .
01,g: NEXT g: NEXT f
4090 FOR f=1 TO 200: NEXT f
4100 GO TO 15
5000 REM hose
5010 PRINT AT 0,3;"M";AT 1,3;"N"
;AT 2,3;"N";AT 3,3;"N";AT 4,3;"O"
5015 PRINT AT 4,x2;"P";AT 2,5;"(
sp)";AT 3,4;"(sp)"
5020 LET x2=x1: LET x1=x1+1
5030 FOR f=1 TO 23
5035 IF x2=20 AND s2>2 THEN  GO
TO 4000
5040 PRINT AT 4,x2;"P";AT 3,x2;"
(sp)";AT 4,x1;a$;AT 3,x1;b$
5045 PRINT AT s2,20;"(2*sp)";AT s1,2
0;"UL": LET s2=s1: LET s1=s1+d:
IF s1>3 OR s1<1 THEN  LET d=-d
5050 LET x2=x1: LET x1=x1+1
5055 FOR g=0 TO 5: NEXT g
5060 NEXT f
5070 PRINT AT y1,x1;"PM";AT y1+1
,x1+1;"O"
5075 INK 5
5090 FOR f=6 TO 20: PRINT AT f,3
0;"N": NEXT f
5100 FOR f=0 TO 50: NEXT f
5130 FOR f=6 TO 20: PRINT AT f,3
0;"(sp)": NEXT f
5135 INK 0
5140 FOR f=237 TO 255 STEP 2
5150 PLOT f,0: DRAW 0,24
5160 FOR g=0 TO 10: NEXT g
5170 NEXT f
5180 LET le=le+1: LET sc=sc+(le*
100): FOR f=1 TO 3: FOR g=0 TO 1
0: BEEP .02,g: NEXT g: NEXT f
5200 GO TO 30
6000 DATA 33,10,33,15,41,5,33,10
,53,10,49,10,41,10,33,30
6010 DATA 25,20,25,10,21,20,21,1
0,13,10,5,10,13,10,21,30,21,20
6020 DATA 33,10,33,15,41,5,33,10
,53,10,49,10,41,10,33,30
6030 DATA 25,20,25,10,21,20,21,1
0,13,10,5,10,13,10,5,40
```

ROBBER'S LAIR

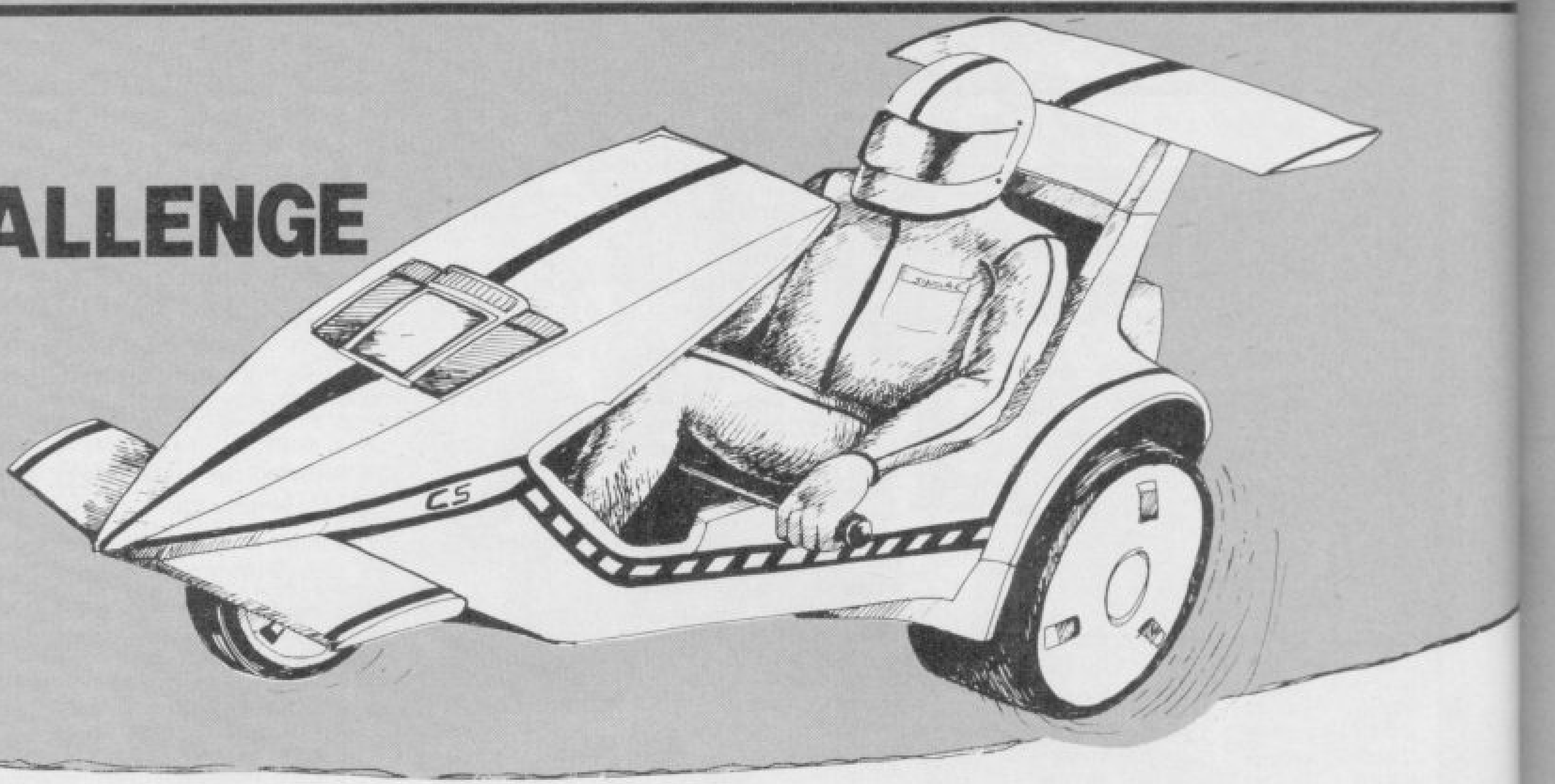
BEAT the robbers at their own game by stealing their loot in **Robber's Lair** by Jason Moody of Thornton Heath in Surrey. You must find your way through the cave system using the cursor keys to move, and collect, as many of the dollars as you can. If you hit any part of the maze your are dead.

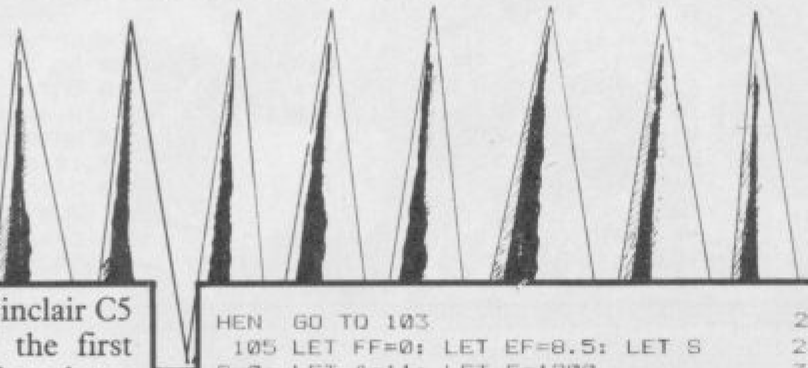
An attractively programmed game, **Robber's Lair** runs on the unexpanded ZX-81.




```
   7 LET D=VAL "10"
   8 LET S=VAL "0"
  10 LET D=D+(INKEY$="8")-(INKEY
$="5")
  12 PRINT AT 10,D;
  13 LET A=VAL "PEEK (PEEK 16398
+256*PEEK 16399)"
  14 IF A=VAL "8" THEN GOTO VAL
"20"
  15 IF A=VAL "13" THEN LET S=S+
VAL "10"
  16 PRINT "8";AT 15,0;"▒
            ▒";AT 15,RND*19;"$";A
T 15,RND*19;"▒";AT 15,RND*17;"▒▒
";AT 15,RND*14;"▒▒▒▒"
  18 SCROLL
  19 GOTO VAL "10"
  20 PRINT AT 19,0;"SCORE $";S
```

C5 CHALLENGE





TEST DRIVE the Sinclair C5 in what must be the first computer game based on Uncle Clive's electric buggy. **C5 Challenge** was written by Jason Moody of Thornton Heath in Surrey for any Spectrum.

You must test a prototype over six circuits of a track, jumping over spikes and praying your battery does not run out.

The program uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before entering the listing.

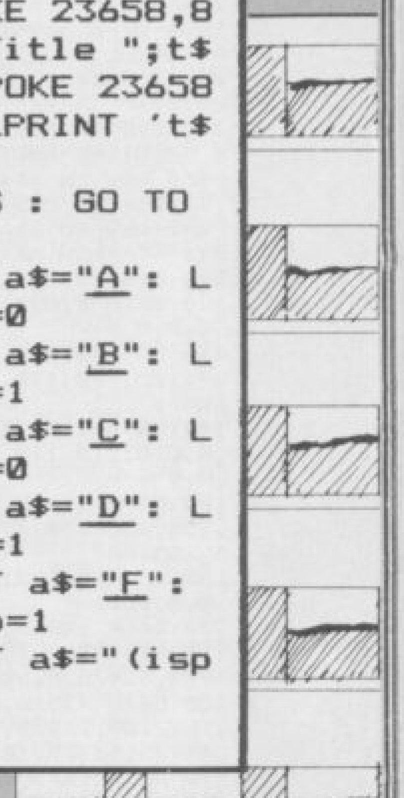
```
   8 RESTORE
   9 REM  DEFINE GRAPHICS
  10 FOR N=0 TO 71: READ A: POKE
 USR "A"+N,A: NEXT N
  20 DATA 0,0,0,0,0,128,224,240,
248,220,190,127,253,237,146,12
  30 DATA 0,0,48,28,15,7,1,0,15,
255,1,254,255,255,255,0
  40 DATA 32,112,112,32,112,124,
112,158,224,127,127,63,191,63,79
,128
  50 DATA 0,0,4,6,7,15,23,23,47,
44,24,9,11,9,4,3
  55 DATA 45,82,0,192,3,0,74,137
  70 LET HI=0
  95 PRINT AT 5,6;"INSTRUCTIONS
(Y/N)"
  97 INPUT I$: IF I$="Y" THEN  G
O SUB 1000
 100 IF I$="N" THEN  GO TO 102
 101 GO TO 90
 102 PRINT AT 5,0;"ENTER SKILL L
EVEL 1=EASY  2=FAST           3=SU
PER FAST"
 103 INPUT SK: IF SK<1 OR SK>3 T
HEN  GO TO 103
 105 LET FF=0: LET EF=8.5: LET S
C=0: LET A=11: LET F=1200
 107 FOR G=5 TO 0 STEP -1
 110 LET A$="(19*sp)": FOR N=0 T
O 75: LET A$=A$+("^" AND RND*10>
=EF)+"(2*sp)": NEXT N: LET A$=A$
+A$+"(33*sp)"
 112 PRINT AT 14,12;"LEVEL ";(5-
G)+1: PAUSE 50
 115 BORDER 0: PAPER 0: CLS : BR
IGHT 1: INK 7
 120 PRINT  INK 5;AT 0,0;"SCORE
: ";SC;AT 2,0;"HI SCORE : ";HI
 125 PRINT AT 4,0;"BATTERY : "
 130 PRINT  PAPER 4;AT 13,0;"(33
*sp)"
 155 FOR L=1 TO LEN A$
 160 LET SC=SC+1: LET F=INT (F-.
2)
 165 PRINT AT 0,8;SC;AT 4,10; FL
ASH FF;F; FLASH 0;"(3*sp)"
 170 PRINT AT 12,0;A$( TO 31)
 175 IF INKEY$="7" THEN  LET A=A
-1: BEEP .01,10: LET F=F-10
 177 IF F<200 THEN  LET FF=1: IF
 F<1 THEN  GO TO 400
 180 FOR C=8 TO 11: IF SCREEN$ (
12,C)="^" AND A=11 THEN  GO TO 4
00: NEXT C
 190 PRINT AT A,8;"GECA";AT A+1,
8;"HFDB"
 195 FOR N=1 TO G: NEXT N
 200 PRINT AT A,8;"(4*sp)";AT A+
1,8;"(4*sp)"
 203 LET A=11
 205 LET A$=A$(1+SK TO )
 207 IF LEN A$<=31 THEN  GO TO 2
30
 210 BEEP .001,30: BEEP .001,20
 220 NEXT L
 230 CLS
 235 PRINT AT 3,14;"BONUS";TAB 1
4;"(5*g3)"
 240 PRINT AT 7,0;"BATTERY X 10
: ";: LET BB=F*10: PRINT BB
 270 LET SC=INT (SC+BB)
 280 LET F=1200
 282 LET FF=0
 283 LET EF=EF-.3
 285 PAUSE 200
 300 NEXT G
 310 PAUSE 200: CLS
 315 PRINT "WELL DONE YOU HAVE C
OMPLETED ALLTHE CIRCUTS  BONUS 5
000"
 320 LET SC=SC+5000
 330 PRINT AT 10,7;"FINAL SCORE
= ";SC
 340 GO TO 410
 400 FOR N=1 TO 50: BEEP .001,N:
 PRINT  INK RND*8;AT 11,8;"BDCE"
;AT 12,8;"GHFA": NEXT N
 410 PAUSE 300
 420 IF SC<HI THEN  GO TO 500
 430 CLS
 435 PRINT AT 3,2;"WELL DONE YOU
 HAVE BEATEN THE        HIGH SCOR
E OF TODAY"
 440 LET HI=SC
 500 PRINT AT 16,0;"ANOTHER GO ?
 (PRESS ANY KEY)"
 510 PAUSE 0
 511 CLS
 520 GO TO 90
1000 PAPER 7: CLS : INK 0: BORDE
R 7
1020 PRINT ,,"As a close friend
of Sir Clive  Sinclair,he wants
you to test   his new invention
:THE C5 CAR "
1030 PRINT "As this is the proto
type there  has been no more mad
e and that  means if you crash t
hen your    game is over"
1040 PRINT ,,"You have to comple
te a circut   6 times at differe
nt speeds.    You use key 7 to j
ump over the  spickly spikes (↑)
,but hitting  one causes you to
crash         You must also watc
h you battery power as when this
 reaches 0    then your game is
over"
1080 PRINT "THERE ARE MORE SPIKE
S EVERY LEV."
1900 PAUSE 0: CLS
2000 GO TO 102
```

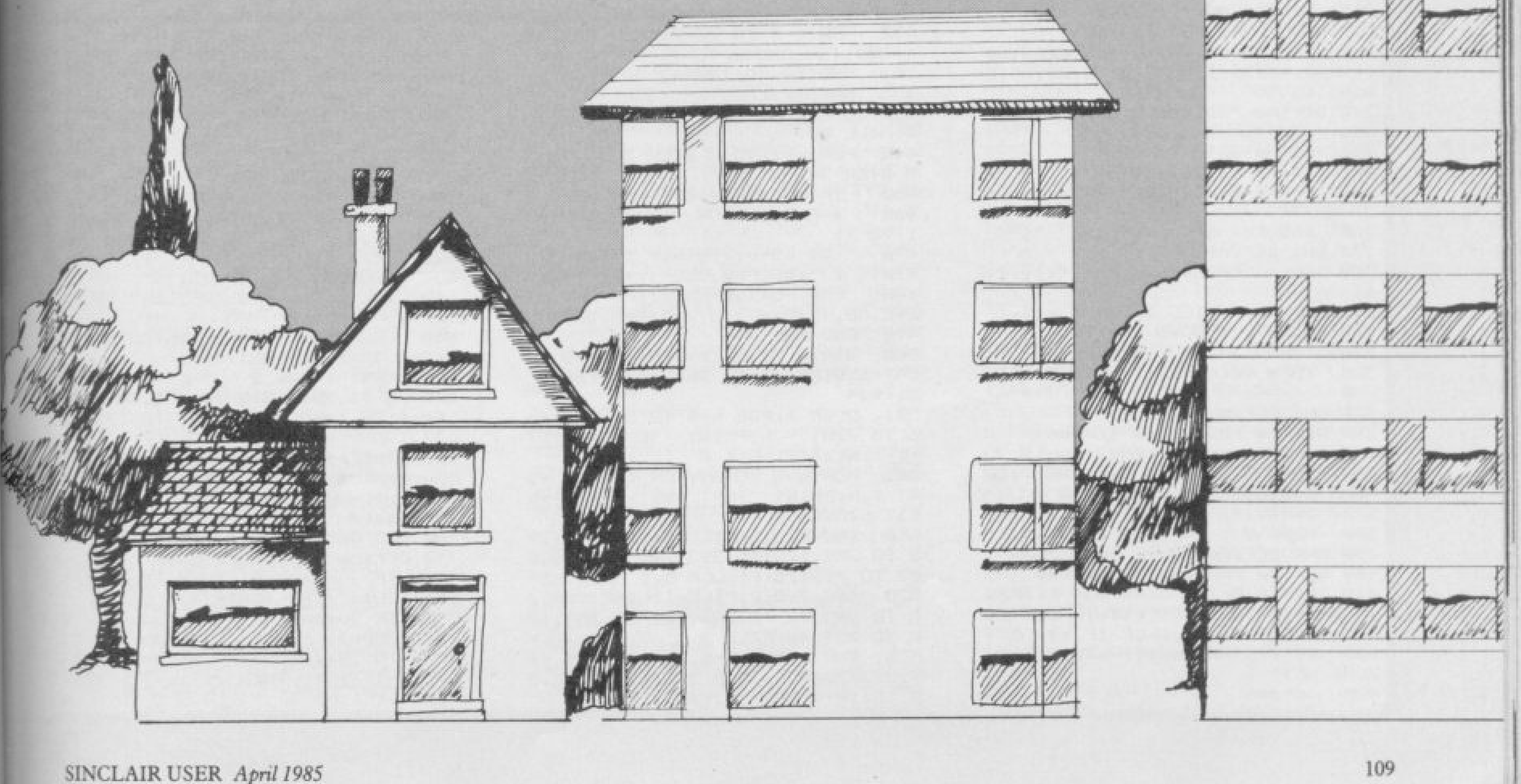
```
  10 FOR f=0 TO 47: READ d: POKE
 USR "a"+f,d: NEXT f
  20 DATA 254,254,254,0,239,239,
239,0,254,254,0,239,239,0,254,25
4,170,85,170,85,170,85,170,170,8
5,170,85,170,85,170,85,170,2,6,4
,56,72,88,176,192,255,145,145,14
5,145,145,153,255
  30 BORDER 4: PAPER 6: CLS : PR
INT '"(9*sp),(cc3,BB), BUILDER (
cc3,BB)"'"(9*sp),(cc2,AA),(9*sp)
,(cc2,AA)"'''"USE KEYS:"''"5,6,7
,8 to lay bricks"'"CAPS SHIFT to
 remove bricks"
  40 PRINT ''"PRESS KEYS:"''"1 t
o 4 to change brick type"'"W for
 windows"'"D for doorways"'"Z to
 COPY to your printer"'"X to Cle
ar screen & start again"
  50 PAUSE 0: CLS
  60 LET x=0: LET y=0
  70 LET k=49: GO TO 150
  80 PAUSE 1: PRINT AT x,y; INK
1;"(cc1,E)"
  90 PAUSE 0: LET k=CODE INKEY$
 100 BEEP .01,k/4: PRINT  INK i;
 PAPER p; BRIGHT b;AT x,y;a$
 110 IF k=8 OR k=9 OR k=10 OR k=
11 THEN  PRINT AT x,y;"(sp)"
 120 LET x=x+((k=54 OR k=10) AND
 x<21)-((k=55 OR k=11) AND x>0):
 LET y=y+((k=56 OR k=9) AND y<31
)-((k=53 OR k=8) AND y>0)
 130 IF k=122 THEN  POKE 23658,8
: INPUT "Please Enter Title ";t$
: PRINT #0;AT 1,0;t$: POKE 23658
,0: LPRINT '': COPY : LPRINT 't$
'
 140 IF k=120 THEN  CLS : GO TO
60
 150 IF k=49 THEN  LET a$="A": L
ET i=2: LET p=7: LET b=0
 160 IF k=50 THEN  LET a$="B": L
ET i=3: LET p=7: LET b=1
 170 IF k=51 THEN  LET a$="C": L
ET i=4: LET p=6: LET b=0
 180 IF k=52 THEN  LET a$="D": L
ET i=4: LET p=6: LET b=1
 190 IF k=119 THEN  LET a$="F":
LET i=0: LET p=5: LET b=1
 200 IF k=100 THEN  LET a$="(isp
)": LET i=0:
 210 GO TO 80
```

BUILDER is a simple but original game for the 16K Spectrum. Written by M J A Turner of Gately in Cheshire it allows you to build structures on the screen using different types and colours of bricks. These can range from semis in suburbia to cottages in the countryside.

The program uses our special abbreviations for graphics and control codes explained on the first page of Program Printout.

BUILDER








```
100 address=RESPR(1000):PAPER 0:
hi=0:hi$='Newby'
110 RESTORE :FOR f=address TO ad
dress+287 STEP 2:READ a:POKE_W f
,a
111 screen:CSIZE 2,1:AT 3,12:INK
 6:UNDER 1:STRIP 2:PRINT' Toweri
ng Inferno ':INK 5:STRIP 1:UNDER
 0:AT 5,11:PRINT 'By P. S. Newby
1985'
112 STRIP 0:REPeat 1:AT 10,0:INK
 RND(6)+1:cprint'Press any key f
or the instructions.':OVER 1:CUR
SOR 3,201:INK RND(6)+1:cprint'Pr
ess any key for the instructions
.':OVER 0:IF INKEY$='' THEN NEXT
 1:ELSE EXIT 1
113 CLS:INK 6:PAPER 2:CSIZE 3,0:
UNDER 1:PRINT'Instructions.':UND
ER 0:INK 4:PAPER 0:CSIZE 2,0:PRI
NT' The object of this game is t
o save the  lives of 42 people t
rapped on a burning   building.'
\' You control your stretcher be
arers with the (CTRL+\)(CTRL+])
keys or a joystick in CTL1.'\' T
he SKILL level controls the spee
d the building burns.'\' Good lu
ck...'
118 STRIP 0:CSIZE 2,1:REPeat 1:A
T 10,0:INK RND(6)+1:cprint'Press
 any key to play.':OVER 1:CURSOR
 3,201:INK RND(6)+1:cprint'Press
 any key to play.':OVER 0:IF INK
EY$='' THEN NEXT 1:ELSE EXIT 1
119 display
120 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
130 DATA 0,0,0,0,2570,2570,41120
,41120,170,170,130,0,60,255,255,
60
140 DATA 2570,2570,41120,41120,0
,0,515,515,170,170,170,170,40,40
,0,0
150 DATA 27668,27668,170,150,150
,150,150,150,170,170,130,0,60,25
5,255,60
160 DATA 0,0,0,0,0,0,0,0,0,0,0,0
,0,0,0,0
170 DATA 10815,10815,43262,43262
,33002,33002,43262,43262,43775,4
3775,33475,0,60,255,255,60
180 DATA 43516,43516,10943,10429
,169,169,10429,10429,43775,43775
,43775,43775,10300,10300,0,0
190 DATA 45136,45136,41200,8304,
8304,10879,10879,10879,43775,437
75,33475,0,60,255,255,60
200 DATA 10300,43775,60,60,60,60
,43520,43520,10240,10240,20,85,8
5,65,65,65
210 DEFine PROCedure g(a,x,y)
220  addr=a*16+address
230  FOR d=0 TO 15
240   poss=131072+(x+d)*128+y
250   POKE_W poss,PEEK_W(addr+d*
2)
260  END FOR d
270 END DEFine
280 DEFine PROCedure tri (x1,y1,
s1)
290  PENDOWN:FILL 1:POINT x1,y1
300  TURNTO 0:MOVE 2*s1
310  TURN 135:MOVE s1*SQRT(2)
320  TURN 90:MOVE s1*SQRT(2):FIL
L 0
330 END DEFine
340 DEFine PROCedure screen
350  OPEN#1;con_:OPEN#2;con_
360  WINDOW 502,240,5,6:INK 7:BO
RDER 1,2,6,3:SCALE 238,0,0
370  INK#2;4
380  MODE 8
390 END DEFine
400 DEFine PROCedure display
410  STRIP 0:INK 5:REPeat l:INPU
T 'Skill ?(1 to 5)';s$:IF LEN(s$
)<>1 THEN NEXT l:ELSE IF s$>'0'
AND s$<'7' THEN skill=s$:EXIT l:
ELSE NEXT l
420  screen
430  FOR f=0 TO 70:BEEP 0,RND(50
)+200:INK RND(1 TO 7):POINT RND(
502),RND(50 TO 100)*2.38
435 INK 6:FILL 1:ARC 30,198 TO 3
0,218,-PI:ARC 30,198 TO 30,218,-
4:FILL 0
440  FOR x=2 TO 6 STEP 2,33 TO 3
8 STEP 2
450   IF NOT RND(10) THEN NEXT x
460   a=RND(2):FOR y=a TO RND(a+
1 TO 7)
470    AT 15-y,x:STRIP 1:INK 5:P
RINT '[]':BEEP 0,255-(x*7+y)*2.8
480   END FOR y:INK 2:tri x*7.5/
2*2.38,(y+8)*10+8,7.5/2*2.38
490  END FOR x
500  STRIP 7:INK 0:FOR f=6 TO 18
:AT f,8:PRINT TO 28;'(sp)':BEEP
0,f*14
501  OVER 1:FOR h=8 TO 29:FOR f=
6 TO 7:AT f,h:PRINT '(CRTL+SHIFT
+Z)':NEXT f:NEXT h
502  FOR h=8 TO 29:FOR f=6 TO 7:
AT f,h:PRINT '(CRTL+8)':NEXT f:N
EXT h:OVER 0
510  INK 7,0,3:FILL 1:LINE 71,17
8 TO 259,178 TO 293,202 TO 108,2
02 TO 71,178:FILL 0
520  INK 7,0,2:FILL 1:LINE 259,4
8 TO 293,72 TO 293,202 TO 259,17
8 TO 259,48:FILL 0
530  INK 0:FOR f=8 TO 29:LINE f*
7.5/2*2.38,4*10+8 TO f*7.5/2*2.3
8,15*10+8:BEEP 0,f*8
540  INK 0:FOR f=4 TO 17:LINE 8*
7.5/2*2.38,f*10+8 TO 29*7.5/2*2.
38,f*10+8 TO 123*2.38,f*10+8+23.
8:BEEP 0,f*15
550  BEEP 0,205,50,63,-8:
570  g 2,180,2
580  g 4,180,4
590  g 6,180,6
600  FOR f=0 TO 3*7.5/2*2.38
610   FOR h=17,18:AT h,8:PAN 2,3
:PAN -1,4
620  NEXT f
630  BEEP 0,1,1,1,7,15,15
640  INK 5:FOR f=0 TO 7.5*2.83 S
TEP 2
650   FOR h=2 TO 4 :POINT 5.8*7.
5/2*2.38+f,62+SQRT(f)*h
660  NEXT f:INK 2
670  g 16,200,50:g 16,200,60:FOR
 f=-1 TO 1:ARC 147+f,37 TO 173+f
,37,1
680  x=17:fpos=20*2.38+1:sc=0:ju
mpers=0:y$=FILL$('(CRTL+SHIFT+.)
',21):floor=2
690  game
700 END DEFine
710 DEFine PROCedure game
720  IF jumpers=21 THEN floor=1:
y$=FILL$('(CRTL+SHIFT+.)',21)
730  IF jumpers=42 THEN burnt
740  REPeat loop:jx=5+floor:jy=R
ND(8 TO 28):BEEP:IF y$(jy-7)='(C
RTL+SHIFT+.)' THEN y$(jy-7)='(sp
)':EXIT loop
```



FRED Astaire and assorted movie stars are once more trapped on the upper floors of a blazing hotel. You must rescue them from the building by catching them in stretchers as they plummet.

Inferno was written by P S Newby from Oldham in Lancashire, for the QL. The program demonstrates the use of graphics on the QL both for text and simple animation. It also uses sound effects. Full instructions are included in the game.

The program uses our special abbreviations for graphics characters, so please read the instructions on the first page of Program Printout before entering the listing.

```
741  STRIP 0:CURSOR 10,227,-2,-3
:INK 1:PRINT 'Saved..';sc;'(2*sp
)':INK 2:CURSOR 179,227,-3,-3:PR
INT 'Dead..';jumpers-sc;'(2*sp)'
750  jx1=jx:jy1=jy:AT jx,jy:INK
0:STRIP 7:PRINT '(CRTL+SHIFT+.)'
:OVER 1:INK 5:AT 1,1,:PRINT 'Sav
ed..';sc;'(2*sp)':INK 6:AT 1,20:
PRINT 'Dead..';jumpers-sc;'(2*sp
)':jumpers=jumpers+1:OVER 0:STRI
P 0
760  REPeat play
770   AT jx1,jy1:INK 7:OVER -1:P
RINT '(CRTL+SHIFT+.)'
780   AT jx,jy:OVER -1:PRINT '(C
RTL+SHIFT+.)':OVER 0:jx1=jx:jy1=
jy
790   jx=jx+1:IF jx=21 AND (x=jy
 OR x=jy-1 OR x=jy-2) THEN caugh
t
800   IF jx=21 THEN missed
810   fpos=fpos+RND*skill/5:INK
2,6,RND(3):LINE 30*2.38+1,fpos T
O 108*2.36+3,fpos TO 123*2.38,fp
os+23.8
820   a$=INKEY$
830   IF a$=CHR$(192) AND x>8 TH
EN x=x-1:FOR f=19,20:AT f,0:PAN
-12,3:NEXT f:IF jx1=19 OR jx1=20
 THEN jy1=jy1-1
840   IF a$=CHR$(200) AND x<29 T
HEN x=x+1:FOR f=19,20:AT f,0:PAN
 13,3:NEXT f:IF jx1=19 OR jx1=20
 THEN jy1=jy1+1
850  END REPeat play
860 END DEFine
870 DEFine PROCedure caught
880  AT 18,0:CLS 2
890  sc=sc+1:BEEP 0,200:g 16,200
,INT(x*3/2)*2:g 16,200,INT(x*3/2
)*2+10:INK 2:FOR f=-1 TO 1:ARC x
*7.5/2*2.38+f,37 TO x*7.5/2*2.38
+26+f,37,1
900  BEEP 0,0:delay 50
910  fpos=fpos+RND(skill/5):INK
2,6,RND(3):LINE 30*2.38+1,fpos T
O 108*2.36+3,fpos TO 123*2.38,fp
os+23.8:IF INT(fpos)>=INT(67*2.3
8) THEN IF floor=2 THEN jumpers=
21:floor=1:ELSE IF INT(fpos)>=IN
T(72*2.38) THEN jumpers=42:burnt
920  game
930 END DEFine
940 DEFine PROCedure missed
950  INK 2:FILL 1:CIRCLE jy1*7.5
/2*2.38+3,238-(jx1*10+8)+5,4,4,0
:INK 7:FILL 0
960  BEEP 0,205,50,63,-8
970  g 10,220,2:g 12,220,4:g 14,
220,6
980  FOR f=0 TO jy1-1
990   FOR h=21,22:AT h,0:PAN 12,
3
1000   delay 50
1010  NEXT f:BEEP 0,150:FOR h=19
,20:AT h,0:CLS 3:NEXT h:g 16,200
,50:g 16,200,60:x=17:INK 2:FOR h
=-1 TO 1:ARC 147+h,37 TO 173+h,3
7,1:NEXT h:INK 7:BEEP 0,255:dela
y 10
1020  BEEP 0,205,50,63,-8:FOR f=
jy1 TO 40
1030   FOR h=21,22:AT h,0:PAN 12
,3
1040   delay 50
1050  NEXT f:AT 20,0:CLS 2
1060  fpos=fpos+RND(skill/5):INK
 2,6,RND(3):LINE 30*2.38+1,fpos
TO 108*2.36+3,fpos TO 123*2.38,f
pos+23.8:IF INT(fpos)>=INT(67*2.
38) THEN IF floor=2 THEN jumpers
=21:floor=1:ELSE IF INT(fpos)>=I
NT(72*2.38) THEN jumpers=42:burn
t
1070  game
1080 END DEFine
1090 DEFine PROCedure burnt
1110  BEEP 0,0,255,1,1,15,15,15:
1111  STRIP 0:CURSOR 10,227,-2,-
3:INK 1:PRINT 'Saved..';sc;'(2*s
p)':INK 2:CURSOR 179,227,-3,-3:P
RINT 'Dead..';jumpers-sc;'(2*sp)
'
1112  OVER 1:INK 5:AT 1,1,:PRINT
 'Saved..';sc;'(2*sp)':INK 6:AT
1,20:PRINT 'Dead..';jumpers-sc;'
(2*sp)':jumpers=jumpers+1:OVER 0
:STRIP 0
1120  FILL 1:INK 2,6:LINE 71,48
TO 259,48 TO 293,72 TO 293,202 T
O 108,202 TO 71,178 TO 71,48:FIL
L 0
1130  FILL 1:INK 7,0:LINE 71,48
TO 259,48 TO 293,72 TO 293,202 T
O 108,202 TO 71,178 TO 71,48:FIL
L 0
1140  INK 0:FOR f=1 TO 150:LINE
70,48 TO 70+f,204:LINE 294,72 TO
 294-f,204
1150  INK 5:FOR f=0 TO 22.5*2.83
 STEP 2
1160   FOR h=2 TO 4 :POINT 5.8*7
.5/2*2.38+f,62+SQRT(f)*h
1170  NEXT f:delay 2000
1180  endgame
1190 END DEFine
1200 DEFine PROCedure delay (f):
FOR del=0 TO f:NEXT del:END DEFi
ne
1210 DEFine PROCedure endgame
1220 BEEP:PAPER 0:CLS
1225 flag=sc>hi
1230 CSIZE 2,1:AT 3,0:INK 2:cpri
nt 'You scored '&sc:IF flag THEN
 INK 1:cprint 'You have beaten '
&hi$&"'s high score.":INK 4:cpri
nt 'Please type your name. (max.
 10 chars.)'
1231 CURSOR 3,61:OVER 1:INK 3:cp
rint 'You scored '&sc:IF flag TH
EN INK 5:CURSOR 3,81:cprint 'You
 have beaten '&hi$&"'s high scor
e.":INK 6:CURSOR 3,101:cprint 'P
lease type your name. (max. 10 c
hars.)':OVER 0:REPeat 1:AT 8,15:
INPUT hi$:IF LEN(hi$)>10 OR LEN(
hi$)<1 THEN NEXT 1:ELSE hi=sc:EX
IT 1
1240 IF NOT flag THEN INK 1:AT 4
,0:cprint "You didn't beat "&hi$
&"'s high score."
1241 IF NOT flag THEN OVER 1:INK
 5:CURSOR 3,81:cprint "You didn'
t beat "&hi$&"'s high score.":OV
ER 0
1250 REPeat 1:AT 10,0:INK RND(6)
+1:cprint'Press any key to play.
':OVER 1:CURSOR 3,201:INK RND(6)
+1:cprint'Press any key to play.
':OVER 0:IF INKEY$='' THEN NEXT
1:ELSE EXIT 1
1260 display
10000 DEFine PROCedure cprint (a
$)
10010  a=LEN(a$)/2:PRINT TO (20.
5-a);a$
10020 END DEFine
```

ZXTEND

ADD THREE new commands to ZX-81 Basic with **ZXtend** by Barry Nicholson of Hebburn in Tyne and Wear. **ZXtend** allows you to use RESTORE, READ and DATA statements more or less in the same manner as Spectrum owners. The utility occupies about ½K of machine code but the loader program requires at least 3K of memory.

The first listing should be entered and then SAVEd. Then type RUN. The program will check that the REM statement holds enough space for the machine code and that A$ — the hex-code — is the correct length. Line 1 is changed to a line 0, and a new line 1 is created. You must not attempt to edit those lines or the program will crash. The program ends with a message about your ROM.

You can now delete all lines after line 1 and use the routine, which is called by RAND USR 16516. Listing two is a set of demonstration routines and instructions. If you need to use it, you can leave out all REM statements with asterisks — e.g. lines 10 to 20. You should read through the listing in any case to understand how to use the new commands. For Listing two to work, you must type it in after LOADing the finished version of Listing one.

If you need to LIST your program, use LIST 1 or nothing will appear on the screen.

Listing one

```
   1 REM 11111111112222222222333
3333333444444444455555555555666666
66667777777777788888888889999999
99900000000000111111111122222222
23333333333344444444445555555555
66666666667777777778888888888999
99999990000000000001111111112222
22222333333333344444444445555555
55566666666666677777777788888888
89999999999000000000000111111112
22222222223333333333344444444555
55555566666666666777777777788888
8888899999999990000000000
   2 REM LINE-1 MUST CONTAIN
     EXACTLY 400 CHARACTERS.
   3 REM 1
   4 LET A$="00009201EA76762A294
0232323237EFEEA205E237EFE3720582
37EFE2A2052237EFE38C22C41237EFE3
92045237EFE34203F"
   5 REM 2
   6 LET A$=A$+"237EFE3720392 37E
FE2A2033237EA728FBFE762007210000
227B40C9FE1C381FFE26301B221640CD
48"
   7 REM 3
   8 LET A$=A$+"15FE762011CD8A15
380C60697CFEF03005CDD809180DCF1A
CF0D217D40E5E1CDF209EB7EFE7628F0
E5"
   9 REM 4
  10 LET A$=A$+"232323237EFEEA20
EC237EFE2920E6237EFE2620E0237EFE
39200A237EFE2620D4237EA72071227B
40"
  11 REM 5
  12 LET A$=A$+"D1C9FE26208E237E
FE29208B237EA720B3232216402A7B40
7CB5CCF2407EFE76200423CDFB40CD3C
0D"
  13 REM 6
  14 LET A$=A$+"2A16407EFE1A2804
FE76208FE5FDCB2D4E28082A1840237E
FE0D2808183CFDCB017620362A7B4023
7E"
  15 REM 7
  16 LET A$=A$+"FE0B201B545D237E
FE762810FE0B28021BF4237EFE1A2806
FE762802CF1B227B402B137EA7ED5244
4D"
  17 REM 8 .
  18 LET A$=A$+"CDC312CD2113183F
2A7B400E00237EFE162004237E0E0154
5DFE1B38D6FE2630D2237EFE1A2806FE
76"
  19 REM 9
  20 LET A$=A$+"280218EC227B40EB
C5CD4D00CDD914C179A72803EF1834FD
CB01F6CD2113E17EFE76C8C33B417600
01"
  21 REM 10
  22 LET A$=A$+"1A00EA30BFBDB9AA
B3A98000273E00271B332E282D343138
343300"
  23 IF LEN A$<>810 THEN GOTO 50
  24 LET P=(PEEK 16511+256*PEEK
16512)-2
  25 IF P<>400 THEN GOTO 60
  26 LET B=16509
  27 FAST
  28 FOR K=1 TO LEN A$ STEP 2
  29 POKE B,16*(CODE A$(K)-28)+C
ODE A$(K+1)-28
  30 LET B=B+1
  31 NEXT K
  32 CLEAR
  33 POKE 16511,116
  34 POKE 16419,1
  35 SLOW
  36 IF PEEK 3875=205 AND PEEK 5
274=42 THEN GOTO 45
  37 PRINT "YOU HAVE A MK.1 ROM"
  38 POKE 16599,68
  39 POKE 16606,134
  40 POKE 16806,191
  41 POKE 16809,29
  42 POKE 16859,213
  43 POKE 16874,29
  44 STOP
  45 PRINT "YOU HAVE A MK.2 ROM"
  46 STOP
  50 PRINT "ERROR  A$ DOES NOT C
ONTAIN THE    CORRECT NUMBER OF C
HARACTERS"
  51 STOP
  60 PRINT "ERROR"
  61 PRINT "LINE-1 CONTAINS ";P;
" CHARACTERS"
  62 STOP
  70 SAVE "ZXTEND"
  80 REM
  90 REM    **************
```

Listing two

```
  10 REM *DEMONSTRATION LISTING
  15 REM *
  20 REM *   IT IS BEST TO USE A
VARIABLE NAME FOR THE USR NUMBER
  30 LET XTEND=16516
  40 REM *
  50 REM *  NEXT YOU MUST RESET
THE DATA POINTER.NOTE THAT LINE
70 IS A FUNCTIONAL PART OF THE
PROGRAM AND MUST FOLLOW THE USR
CALL IN LINE 60.

  60 RAND USR XTEND
  70 REM RESTORE
  80 REM *
  90 REM * IF YOU WISH, YOU MAY
SET THE DATA POINTER TO A GIVEN
LINE NUMBER,BUT YOU CAN NOT USE
VARIABLES IN A RESTORE LINE.

 100 RAND USR XTEND
 110 REM RESTORE 200
 120 REM *
 130 REM *THE FOLLOWING ROUTINE
IS SIMILAR TO THE ONE GIVEN ON
PAGE 102 IN THE ZX81 MANUAL.

 140 PRINT "THIS ZX81 PROGRAM WI
LL WORK"
 150 DIM M$(12,3)
 160 PRINT
 170 FOR N=1 TO 12
 180 RAND USR XTEND
 190 REM READ M$(N)
 200 PRINT "M$(";N;")= ";M$(N),
 210 NEXT N
 220 REM DATA "JAN","FEB","MAR",
"APR"
 230 REM DATA "MAY","JUN","JUL",
"AUG"
 240 REM DATA "SEP","OCT","NOV",
"DEC"
 245 REM *
 250 REM * "READ" LIKE "RESTORE"
MUST FOLLOW A USR LINE, BUT THE
DATA LINES DO NOT.THE DATA LINES
CAN BE PLACED ANYWHERE IN THE
PROGRAM. YOU CAN NOT PUT A
VARIABLE IN A DATA LINE.

 260 REM *THE NEXT ROUTINE WILL
LOAD A NUMERIC ARRAY FROM WITHIN
A DOUBLE FOR-NEXT-LOOP.NOTE THAT
EACH NUMBER IN THE DATA LINE
USES 6 BYTES LESS MEMORY THAN IT
WOULD IN A NORMAL LINE.

 270 PAUSE 150
 275 PRINT
 280 PRINT
 285 PRINT "NUMERIC ARRAY"
 290 DIM A(3,6)
 300 FOR J=1 TO 3
 310 PRINT
 320 FOR K=1 TO 6
 330 RAND USR XTEND
 340 REM READ A(J,K)
 350 PRINT A(J,K);" ";
 360 NEXT K
 370 NEXT J
 380 REM DATA 8,7,6,5,4,3,-1,-96
5.2,-10,.125,0.75,-7.5,2,132.45
,520000,-2525,.0007
 390 REM *
 400 REM *  THE WORDS "READ" AND
"DATA" MUST BE FOLLOWED BY A
"SPACE".    DATA ITEMS MUST BE
SEPARATED BY A "COMMA".   STRING
DATA MUST BE ENCLOSED BY QUOTES.

 410 REM * YOU CAN HAVE AS MANY
VARIABLES AS YOU LIKE IN A READ
LINE,BUT EACH VARIABLE MUST BE
SEPARATED BY A COMMA.
YOU CAN READ DATA INTO A SLICE
OF A STRING.
 420 PAUSE 150
 430 PRINT
 450 PRINT "STRING SLICE AND EVA
LUATION"
 460 PRINT
 470 REM DATA "***********",3,8,"
ZXTEND"
 480 RAND USR XTEND
 490 REM READ C$,A,B,C$(A TO A*B
/A)
 500 PRINT "C$= ";C$
 510 REM *
 515 REM * THE WORD "TO" USED IN
LINE 490 IS A KEY-WORD.  YOU MAY
USE KEYWORDS WITHIN THE CONFINES
OF ARRAY OR STRING BRACKETS.

 520 REM *  NOTE YOU CANNOT USE
NUMBERS IN A READ LINE. YOU MUST
USE PREDEFINED VARIABLES FOR THE
ELEMENTS OF A STRING OR THE
DIMENSIONS OF AN ARRAY.  HOWEVER
YOU CAN USE VARIABLE NAMES WHICH
CONTAIN DIGITS EG - X2

 530 REM *  YOU CANNOT USE OTHER
BASIC WORDS SUCH AS "IF"OR"THEN"
IN THE "READ" LINE, BUT YOU CAN
MAKE CONDITIONAL READ OR RESTORE
BY PUTTING THE ARGUMENT IN THE
USR LINE WHICH PRECEDES IT.

 540 PAUSE 150
 550 PRINT
 560 IF A=3 THEN RAND USR XTEND
 570 REM RESTORE 470
 580 IF B=8 THEN RAND USR XTEND
 590 REM READ C$
 600 PRINT "CONDITIONAL READ AND
RESTORE"
 610 PRINT
 620 PRINT "C$ NOW = ";C$
 630 REM *
 640 REM *ZXTEND IS PROTECTED BY
MANY ERROR-TRAPS,AND SHOULD NOT
CRASH IF YOU MAKE TYPING ERRORS.
IF AN ERROR IS FOUND,THE PROGRAM
WILL STOP WITH A REPORT CODE.THE
LINE NUMBER WILL BE THAT OF THE
USR CALL ALTHOUGH THE ERROR MAY
BE IN THE READ-LINE,OR THE DATA-
LINE WHICH READ WAS LOOKING AT.

 650 REM *TO HELP FIND ERRORS
  ZXTEND USES THE NORMAL ERROR
  CODES PLUS 3 MORE -

  ERROR-A   SYNTAX ERROR IN READ
            OR RESTORE LINE.
  ERROR-B   SYNTAX ERROR IN DATA
            LINE WHICH READ (OR
            RESTORE WHEN FOLLOWED
            BY A LINE NUMBER) WAS
            LOOKING AT.
  ERROR-E   OUT-OF-DATA  TRYED TO
            READ PAST END OF DATA
            LIST.

 660 REM *THE THREE NEW KEYWORDS
ARE DESIGNED TO BE USED WITHIN
A PROGRAM LISTING AND CANNOT BE
USED AS DIRECT COMMANDS.HOWEVER
IT IS POSSIABLE TO RESTORE THE
DATA POINTER DIRECT THROUGH THE
KEYBOARD BY USING -

          RAND USR 16580

 670 REM ***********************
```



TEN GAMES for the price of two, and every one a hit, in an unbeatable offer to our readers!

Mega Hits is a selection of ten smash games, compiled under licence from the original software houses.

3D Starstrike is a hair raising shoot-em-up with full 3D graphics from Realtime Software.

Blue Thunder from Elite takes you and your jetcopter on a dangerous rescue mission. **Fall Guy** from the same company follows the exploits of Colt Seavers, of the popular TV series.

Alligata's **Son of Blagger** is a levels and ladders game in which Slippery Sid tries to find the golden keys in the Security HQ.

Wally Week is the now infamous star of **Automania** from Mikrogen. Wally has six cars to assemble in his garage, but finds his shelves less than reliable – and what about those bouncing tyres?

Quiksilva produces **Bugaboo,** in which the cosmic flea leaps from ledge to ledge to escape the hungry monster.

Psytron combines arcade action with complex strategy in the most challenging space game of 1984. Beyond's game contains advanced graphics with split screen display and simulated windows.

Or try **Wheelie** from Microsphere, and drive the Zedexaki 500 bike into a world of giant hedgehogs and sudden death.

In **Blade Alley** the aliens are back again, and you must pilot your interceptor through the defensive trench to trigger the photon disruptors.

Finally, **Penetrator** from Melbourne House is still one of the nastiest, toughest, fastest arcade games around.

If you bought them separately, the ten games would cost you well over £70 in the shops. Beau Jolly have put all 10 on two cassettes, with each recorded in fast-load for extra ease of playing. The package will retail at £19.99, but readers of *Sinclair User* can save £3.50 and buy it for £16.49, including postage and packing. Just fill out the coupon below.

To: **Mega Hits Special Offer, Sinclair User, Priory Court, 30-32 Farringdon Lane, London EC1R 3AU.**
BLOCK CAPITALS PLEASE
Please send me:

Qty			Total
	Mega Hits	@ £16.49	

I enclose a cheque/postal order for £............. made payable to Sinclair User magazine.
Please debit my Access/Visa account no. [| | | | | | | | | | | | | | | |] for £.......
Signed .... Date ....
Name ....
Address ....
.... Tel ....

Offer applies to UK readers. Allow 28 days for delivery. Offer applies while stocks last.

QL NEWS

News from the world of Sinclair QL computing.



The communications explosion takes shape!

Communications are now the most exciting, essential part of any computer.

In the past six months alone, over 150,000 modems have been sold in the UK.

Now, the QL's own communications explosion is taking shape... and it has the potential to make more of communications than any other micro!

Read on and discover exciting new ways to use your QL... with the QL modem... telephony unit... and powerful interface options.

Nº2



DAVID KARLIN

Why Q COM is everything you could wish for in communications.

The QL is now communicating – via Q COM! This exciting three-part peripheral presents QL users with a multitude of ways to exploit the world of communications.

Once connected to the QL, Q COM allows you to access the considerable number of phone-in databases, such as Prestel and QNet.

Q COM enables you to communicate with other computer users. Its facilities include electronic mail, data transfer from Microdrives and bulletin boards.

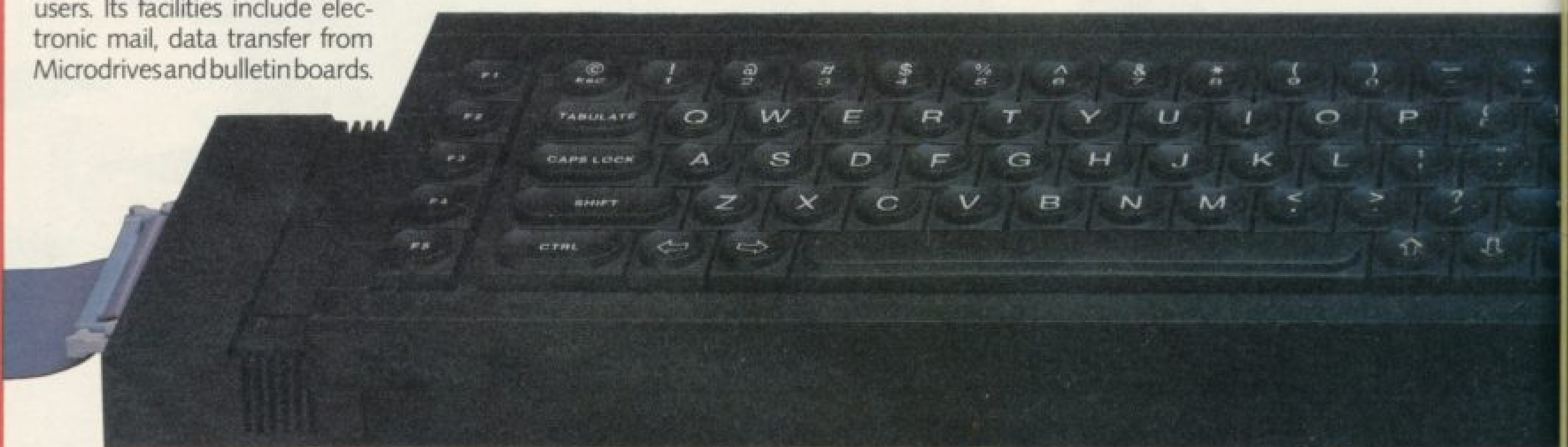
Through it you can link your QL to larger minicomputers. Q COM has full capability in this area, and allows the QL to talk to powerful mainframes.

Q COM's automatic dialling and call acceptance facilities, together with the storage of messages from other modems, will revolutionise the way you use your telephone.

The next few pages of QL News tell you much more.

It's enough for me to say here that with the QL and Q COM, you'll be exploring new openings in communications for some time to come!

David Karlin,
Chief Design Engineer.



The Q COM package
Three special parts to stack!

QL communications interface

Q CON

This multi-speed interface contains the sophisticated software used to set up QL communications – and to control the Q CALL and Q MOD units.

Q CON also comes complete with Microdrive-based software. This enables the QL to link to larger computers using VT100 and viewdata protocols.

The software will also run *any* standard modem – connected via Q CON's built-in RS-232-C port.

Most importantly, Q CON allows the QL to transmit and receive at rates switchable from 75 to 9600 baud (encompassing the widely-used 75/1200 Prestel rates, and 1200/1200 half duplex rates for user-to-user exchange).

Q CON is specially styled to suit your QL – with similar fluting and ribs – and forms the base module of a vertical-stacking system.

It's supplied with full instructions, software on Microdrive cartridge, and connecting leads.

QL auto dial/answer unit

Q CALL

Q CALL gives every QL user something out of the ordinary.

It's a module which links directly to your telephone, and allows auto-dialling at the push of a single key. In the same way, it will permit incoming calls to be accepted automatically . . . and even trigger pre-programmed activity from the QL!

Q CALL is the central unit of the package. It plugs directly into Q CON – so there are no connecting cables to worry about.

QL modem

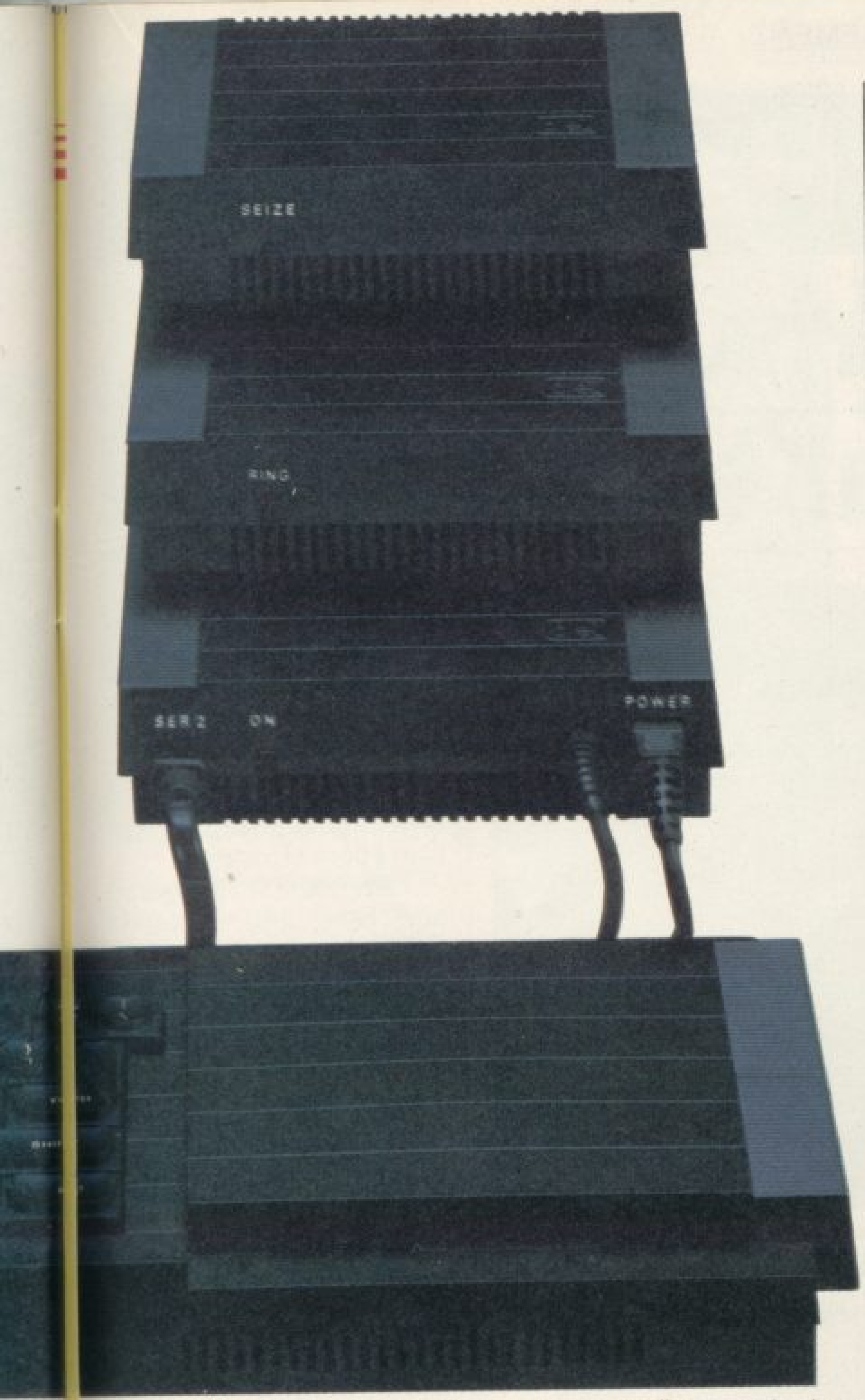
Q MOD

Q MOD has all the powerful facilities expected of a modem, in a neat and simple unit.

It uses either V23 75/1200 or 1200/1200 baud rates, for Prestel, Micronet 800 and all the viewdata services described alongside.

It also incorporates a telephone extension socket for manual dialling.

Q MOD is the top unit of



Exploring the world of QNet, Prestel, Micronet and more!

Thousands of QL users already enjoy the excitement of linking to a nationwide mainframe.

Q COM turns your QL into an intelligent terminal, allowing you to access many thousands of pages of information, software and communications facilities.

The services brought to you through Prestel can include Micronet 800, Viewfax 258 and QNet, the new QL database.

Membership of QNet will bring you free software, QL news and features, and all the wide-ranging services of viewdata!

If armchair shopping is more your style, that's easy too. It's often possible to place a direct order using your QL! For dedicated QL owners, there's a daily selection of software reviews, chart toppers… and all the facts and figures you need to make buying peripherals simple.

With Q COM you can also 'download' software from the system directly into your QL and either use it immediately, or store it on Microdrive cartridge.

In fact the only problem you'll face with a viewdata service is finding enough time to explore its many features!

You can find out how to join QNet by phoning 01-278 3143.









News… information… banking services and QNet. And only a fraction of the QL's new viewdata capability.

Q COM, and comes with a 9' built-in telephone cable.

All three units are available from Sinclair on (0276) 685311 and from selected Sinclair stockists.

The QL hooked on voice and data

The QL can now act as your personal address book and telephone operator!

Q COM allows you to store hundreds of personal or business numbers.

You can store lengthy passwords and account numbers – and recall them – at the touch of a single key.

And any information that's sent to you from other modem-owners can be gathered and stored on Microdrive cartridge, or incorporated into your QL Quill documents!



QL meets the mainframes!

The Q CON unit of Q COM turns your QL into a VT100 terminal, providing instant access to in-house computing services, both mainframe and mini.

Whether you are using your QL at home or at work, Q COM gives you access to electronic bulletin boards which provide help and advice 24 hours a day. You can leave messages or notices for friends or business contacts and even hold live discussions with them.

Additional benefits for the QL business user include easy access of in-house company software, and the interrogation of other data bases around the country.

There's also the opportunity of linking to British Telecom Gold – the widely-publicised and popular messaging service.

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QL Hardware

Microdrive cartridge price cut to only £1.99!



Sinclair Microdrive cartridges – up to 100K of programs and data on a medium so compact you can pop it into your pocket.

On February 1, the cost of Microdrive cartridges came down from £4.95 to £1.99 each.

Microdrive cartridges are the QL's own unique storage medium. Each stores up to 100K of information (that's 40 pages of A4 text), on a cartridge no bigger than a book of matches!

Over 500,000 cartridges are now being used throughout Britain.

You can store up to 50 different data files per cartridge, identified by titles of your own choice.

And QL Microdrives themselves are standard equipment on the new ICL One Per Desk micro, and British Telecom's new Merlin Tonto.

IEEE-488... the instrument connection

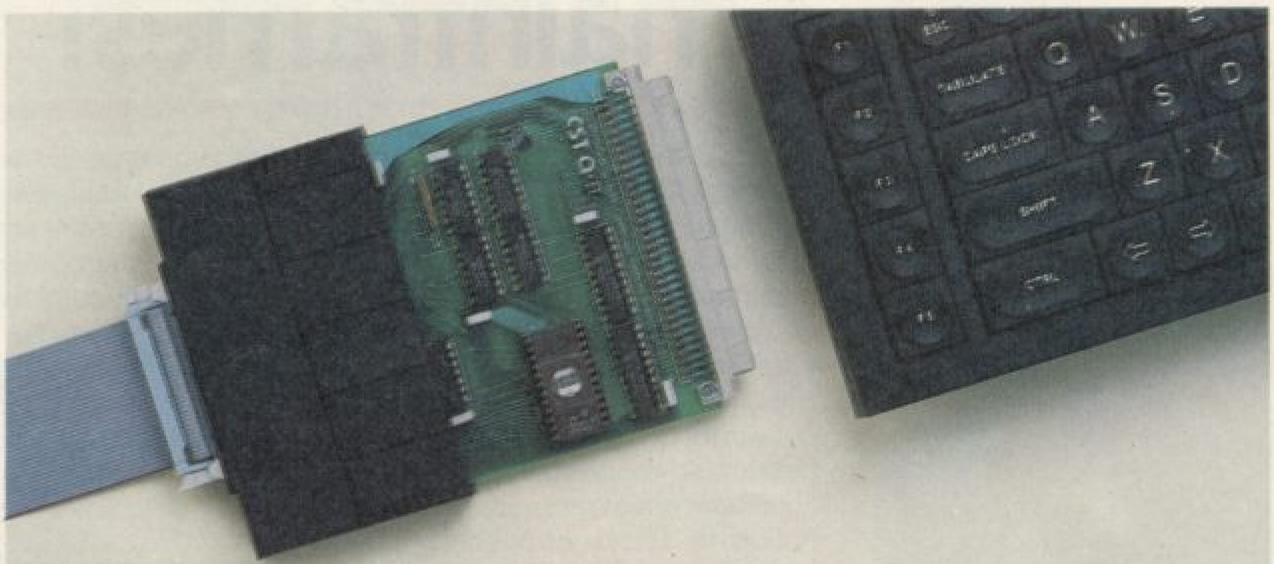
IEEE-488 is the interface standard set by the Institute of Electronic and Electrical Engineers for instrumentation control.

IEEE-488 – or General Purpose Instrumentation Bus – is a parallel interface specifically designed for high speed data transfer between a number of different types of device.

It is commonly used for controlling instrumentation via a computer, allowing the creation of laboratory data acquisition systems, industrial control schemes, etc.

The QL now has a fully-fledged IEEE-488 interface from CST. It plugs neatly into the QL's RAM expansion port, and can control up to 16 instruments simultaneously.

It's available from CST on (0223) 323302.



An IEEE-488 interface slips discreetly into place.

New inte
3½" or 5¼

With new Q-Disk, you can transform the QL into a powerful small business system – comprising QL, monitor, disk interface, twin disk drives and printer.

Q-Disk upgrades the QL to disk storage. Fitting easily into the QL's left hand RAM expansion port, without the need for a special expansion box, it contains a Western Digital disk controller chip. Software is held in an on-board EPROM (so little of the QL's RAM is used).

Plug in Q-Disk, and the QL accepts one or two disk drives, sized 3 in, 3½ in, 5¼ in, either 40 or 80 track, single or double-sided. Even when two drives are used, they can be different types!

Q-Disk offers up to 1.6 Mbytes of quick, reliable storage with a compatible disk drive.

It's made by Computamate, who also offer a full range of



QL to link students

Strathclyde University, in Glasgow, plans to have a campus network of 7,000 QLs linked to a central VAX minicomputer.

That's one QL for every student . . . a major investment project in a university which is now a leading centre for artificial intelligence work.

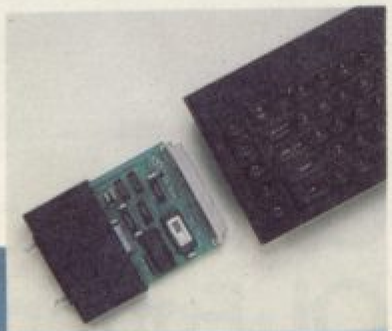
Sinclair is giving support worth £250,000 to the project. And it's likely that QL users everywhere will benefit – the students plan to develop AI programs to run on the QL!

The QL has impressed Prof. James Alty of the University's Computer Science Department, who says *'only the QL could offer the computing power, range of applications, and above all the portability, at a realistic price.'*

erface to connect 3", /4" disk drives

complimentary QL disk drives.

To contact Computamate, phone (0782) 811711.





Single disk unit fitted with 5¼ inch drives and *(inset)* the Q-Disk controller.

The QL's high-tech spec

Dimensions
138 x 46 x 472mm
(5⅜" x 1¾" x 18¾")

Weight
1388 gms (3.055 lbs)

RAM
Massive 128K standard RAM, externally expandable to 640K. Extra RAM is available in 64K, 128K, 256K and 512K units, from third-party suppliers.

ROM
48K, containing Sinclair SuperBASIC and the Sinclair Qdos operating system.

CPU
Motorola 68008 (running at 7.5 MHz) for all principal functions. (Architecturally, the 68008 is a 32-bit processor with an eight-bit data bus. One megabyte of non-segmented address space is available.)

In addition, an Intel 8049 controls the keyboard, generates the sound, and acts as an RS-232-C receiver.

Operating system
Qdos (developed by Sinclair Research) is a single-user multitasking, time-sliced system using Sinclair SuperBASIC as a command language with display handling for multiple screen windows; and device-independent input-output.

Language
Sinclair SuperBASIC, with the advantages of procedure structuring; extendability (including syntax); interpretation speed independent of program size; clean machine code interface; operating system facilities accessible from SuperBASIC; equal capability for strings and arrays; and full error-handling facilities.

Microdrives
The QL incorporates twin QL Microdrives, each with a minimum 100K capacity, 3.5 seconds average access time. Typical loading rate of machine code programs is 2-3K per second.

Video
High resolution graphics capability with colour or monochrome monitor (or TV) in two modes – 512 x 256 pixels (four colours available) and 256 x 256 pixels (eight colours available). Normal character display format of up to 85 x 25 with choice of character sets available (TV format of up to 40 to 60 columns depending on the software).

Keyboard
Full-size, 65-key QWERTY keyboard featuring a space bar, left- and right-hand shift keys, five function keys and four cursor control keys. The keyboard can be angled by means of detachable feet.

Expansion
Excluding RGB monitor, power socket and TV port, eight peripheral/expansion ports are provided – one internal expansion, one Microdrive expansion, one ROM cartridge, two serial and two control channels, and the local area network.

Serial
Two standard RS-232-C communications interfaces for printers, modems, etc. Transmission at rates from 75-19200 baud or full duplex transmit/receive at seven rates up to 9600 baud.

LAN
For up to 64 QL computers. Data transmission over the net can be achieved at 100K baud.

Power supply
9V DC at 1.8A, 15.6V AC at 0.2A.

Joysticks
Provision for one or two devices for games or cursor control.

Applications Software
QL Quill – word processor
QL Abacus – spreadsheet
QL Easel – graphics
QL Archive – database
All four packages supplied with the QL.

Price
£399 including VAT, QL programs, full A4 manual, power supply, 4 blank cartridges and free Helpline service.

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QL Software

Updated versions of Psion software now available!

QL Abacus, Archive, Easel and Quill are the four Psion programs supplied with every QL. They're now converted to 100% machine code, and as a result they load from Microdrive cartridge much faster.

The overlays present in Version One software have been removed, resulting in noticably quicker on-screen performance.

With the compactness of machine code, there's a big saving in QL memory too – all four programs now cope with larger, more professional applications!

Version Two software is now supplied with every new QL. Existing QLUB members – see back page.

QL·Quill

QL Quill makes it easy to type in, correct and store your letters, memos and reports.

No training is needed – a beginner can be using QL Quill for word-processing within minutes!

QL Quill has the facilities of professional word processing packages: including word wrap, search and replace, justification, page headers and footers.

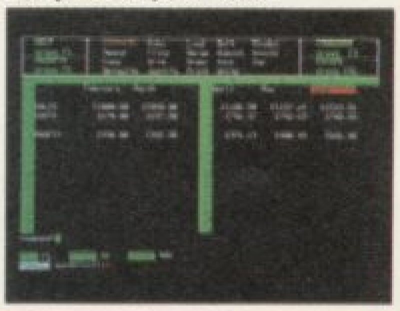


QL·Abacus

QL Abacus is a powerful, yet easy-to-use spreadsheet.

The program allows you to manipulate the contents of whole rows and columns by the names you assign them. There's no need to depend on confusing letters and numbers.

QL Abacus also incorporates a range of functions which let you carry out rapid 'what if' analyses on your data.

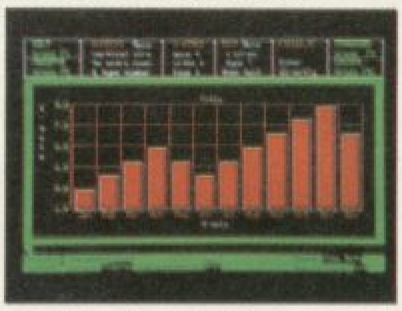


QL·Easel

QL Easel allows you to create graphs, bar charts and pie charts – at the touch of a key.

The program handles anything from lines and shaded curves to overlapping or stacked bars.

QL Easel designs and scales automatically or under your control. Text can be added and altered as simply as data.



QL·Archive

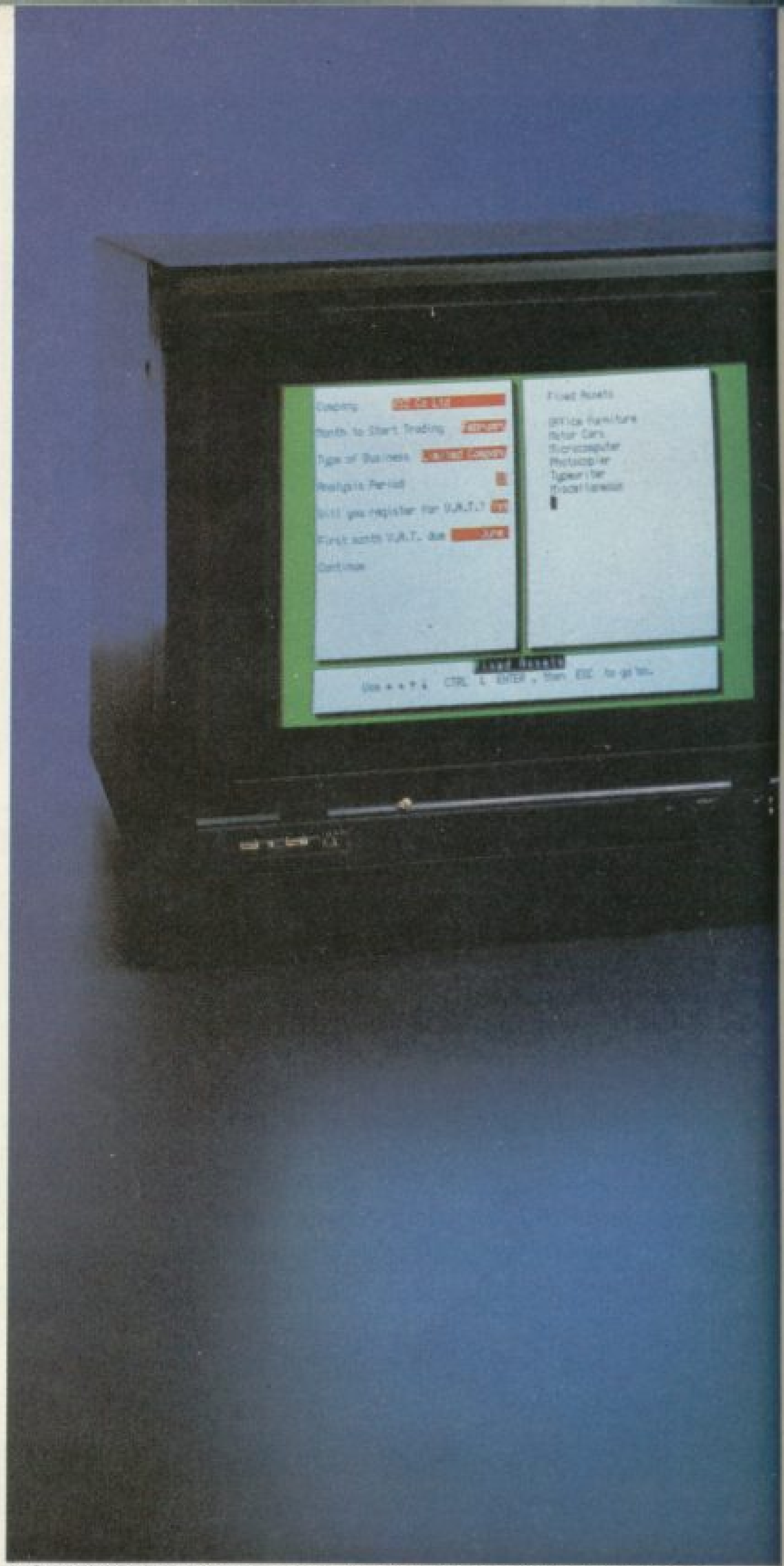
QL Archive is a sophisticated, powerful database program.

It includes a screen editor which allows you to design your own screen and format your reports, and a procedure editor which lets you tailor QL Archive to your own requirements.

QL Archive is ideal for all database uses, yet it's powerful enough to be used by many software houses to generate specific database applications.



Non-members of QLUB can purchase new versions of the above software for £15 per title, or £50 for all four programs. Phone (0276) 686100 for details.



(Left to right) QL Entrepreneur, QL Project Planner and QL Decision Maker from Sinclair.

Coming soon- QL·Entrepreneur, QL·Project Planner, QL·Decision Maker!

Three new QL business programs – with a difference!

QL Entrepreneur, QL Project Planner and QL Decision Maker train you to apply new and exciting management skills – through original and powerful means!

An interactive teaching program gives you a thorough and enjoyable understanding of each subject – backed by a textbook and 'self-test' facilities - and an applications program helps you to use your new expertise for specific problems and projects.

All three titles will increase your understanding and extend your control – making involved subjects easy, stimulating and useful!





QL·Entrepreneur

QL Entrepreneur is an essential program for anyone preparing to start a new business – whatever it may be!

It uses a 'question and answer' format to help you build a workable business plan.

With the input you give, it works out the break-even point of the business; the first 18 months' cash flow, the type of finance needed; the year end Balance Sheet and Profit and Loss accounts . . . and more!

QL Entrepreneur builds your skills and techniques.

It's flexible too, so that you can ask complex 'what if' questions at any stage!

The program comes with a third, blank Microdrive cartridge and a comprehensive A5 manual.

QL·Project Planner

QL Project Planner will produce plans you can understand, monitor and more easily achieve.

First, you break the project down into its individual activities, telling QL Project Planner how long each takes and which are inter-dependent.

When you decide on a starting time/date QL Project Planner will tell you when each activity must start and finish and when the project will be completed.

Each activity is divided into its critically important stages – those which can safely be moved around without altering the time taken by the project and those where movement will affect the completion deadline.

Whether or not you've used project planning systems before, you'll be amazed at the difference QL Project Planner can make.

The program comes with a third, blank Microdrive cartridge and a comprehensive A5 manual.

QL·Decision Maker

Whether you're thinking of buying a house, or taking on a new business contract, QL Decision Maker makes the choices clearer!

It lets you look at the possibilities – and their implications – through a decision tree.

Once you've set out the decisions and their probable costs or results, QL Decision Maker shows the outcomes which would occur from each particular route.

You can see how much money a decision could make for you . . . or cost you. Complex 'what if' questions are dealt with swiftly and graphically.

You can depend on the QL to highlight the best possible route!

QL Decision Maker comes with a third, blank Microdrive cartridge and a comprehensive A5 manual.

All three programs are available from Sinclair stockists, price £39.95 each, or Sinclair Research. Tel: (0276) 686100.

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ADVERTISEMENT

Now, buy a QL and you're a member of the QLUB-free!

QLUB is the special Users Bureau for Sinclair QL owners.

Already, there are well over 10,000 QLUB members . . . enjoying a whole range of information and advisory services.

Until now, joining QLUB cost £35 per year. From March 4, every new QL owner can become a member – free of charge!

With your new QL, you'll find a post-paid form. Complete and mail it, and you'll soon be a member of the fastest growing computer club in the country.

And you'll enjoy all the helpful services listed here!

What QLUB membership offers you

Regular newsletters delivered to your door

One of the most important QLUB benefits is the special news magazine, appearing six times a year. The magazine provides a forum for QL owners to exchange views and keep in touch with all the latest developments.

Each issue is packed with updates on QL hardware and software, tips on applying the four QL programs, and news of how other people are using the QL.



Special discounts

QLUB members also receive a range of special discounts, with savings of at least 20% on selected software products.

There are also special subscription rates for Personal Computer News and QL User.

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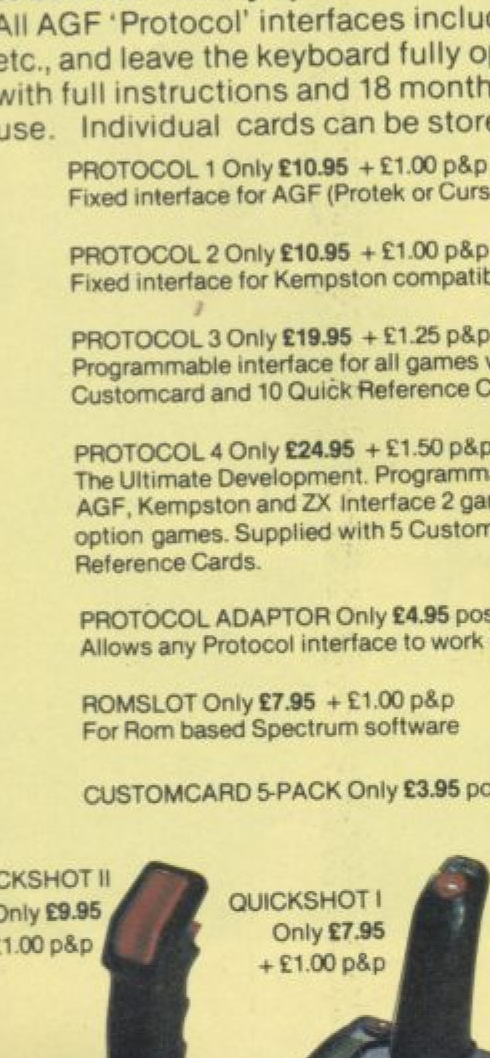
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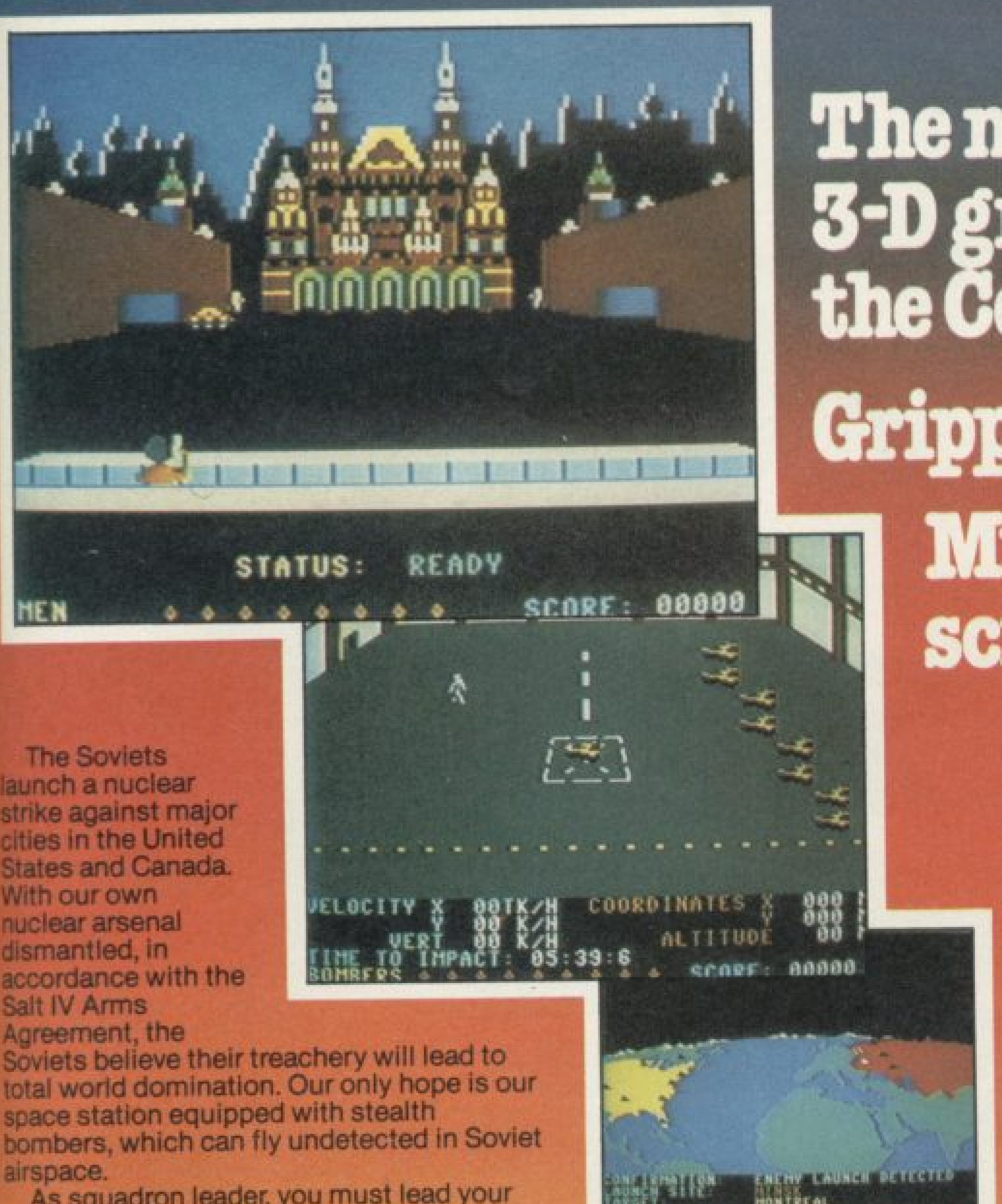
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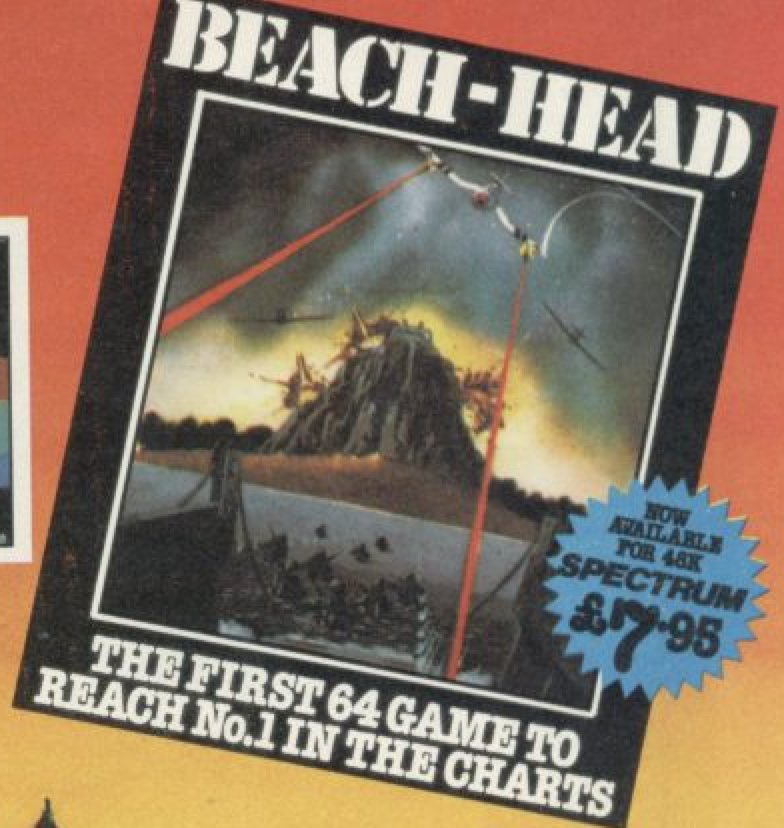
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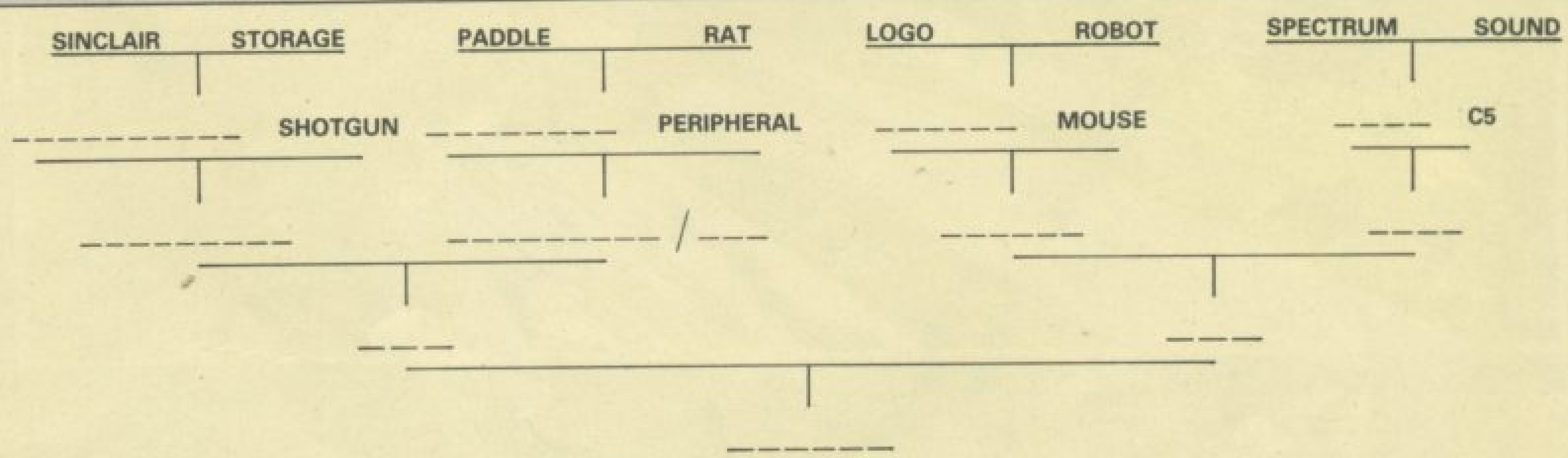


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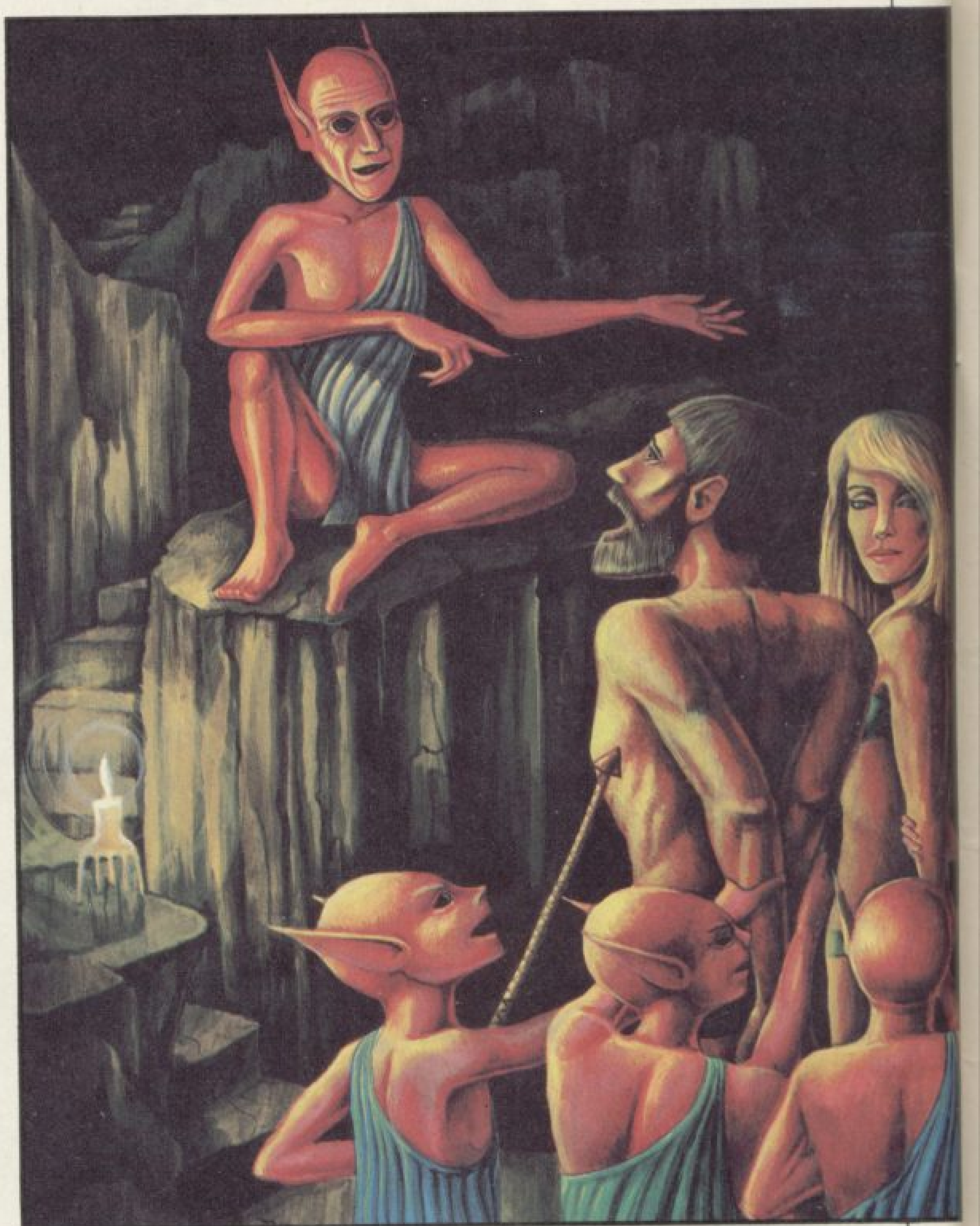
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Teach a hero how to fight

John Gilbert adds the spice of violence to his master-brew for intelligent adventuring



Defining characters is only the beginning of a long process to make them interact with each other.

In the previous instalment of this series we set up the second section of an example adventure, called **The Crysan Incident,** in which an atomic clock which controls the timeflow of the universe was stolen. Three adventurers, Kagan, Marla and Morris have come in search of the yacht in which it was whisked away. They find it at the bottom of the ocean and Kagan and Marla dive only to find that the boat is guarded by two monsters, Boreel and Genghis. There is a sword behind one of the monsters and it looks as if a fight will take place.

Fighting has always been an important element in adventure games but one in which setting the scene and building tension have played little part. Using some artificial intelligence — (AI) — techniques it is possible to make the interaction which occurs between characters in fights more realistic, and the outcome more dependent on characters rather than circumstance.

The general approach to interaction strategy within an AI adventure should be firstly to see whether a fight is desirable — you would not want one if the characters were having a party, for instance. Then you must define the boundaries of interaction, to discover who is involved and whether one more of those characters has an advantage — a weapon or magical object. Only then can the fight take place.

Each phase is dependent on the one before it. The computer will decide if a fight is advisable. That would involve looking at the scenario and the state of the characters, then defining the two, or three, sides; for instance, Kagan would hardly stab his best friend Marla in the back while they are battling the monsters. It makes sense, therefore, to ensure that such a situation cannot take place. You can either build some code into the program to stop it happening or tell the computer to ignore any command from a player which goes against a character's personality traits.

In our example a fight is desirable as the adventure will not continue until the creature, or creatures, have been defeated. There are two aspects of AI adventure theory which must be examined before a fight sequence can be coded, such as the simple fight in listing one.

The first aspect is Limited Event Patterns and it has to do with psychology. The second is the construction of formulae which will ensure a fair fight — those form the main body of listing one.

Limited Event Patterns take their form from the psychology of expectation. Within an adventure the player is expected to make certain moves and, with a little provocation, make decisions. The subroutine in your programs which deals with the fight must take into account six such decisions: 1 — Have the two heroes gone into battle? 2 — How many monsters are there? 3 — Strength ratios between characters (illustrated in listing one); 4 — Is either side carrying weapons? 5 — Ways out of the fight; 6 — Consequences of winning (illustrated in listing one).

The first two factors were dealt with last month when the characters decided whether they wanted to fight. The strength ratios, mentioned in factor three, depend upon the character attributes, also discussed last month.

New formulae for attributes such as cowardice, hatred and agility can be formed from emotion, strength, stress, intelligence, ego and IQ. The formula needed in the fight sequence are anger, courage, agility, ego and strength. Anger is a combination of prime factors stress, intelligence and strength. Courage is formed from stress, strength and ego.

Using the attribute range, between (−10) and (+10), Kagan, Marla and the monsters may have the attributes shown in figure one. Kagan has no negative attributes so is reasonably fit to fight. Marla is not so lucky. She may have the ego of Liberace but she's got the courage and strength of a pencil.

The failings of Marla are, however, balanced when we take into account the two monsters, Genghis and Boreel. They are two mega-wimps, unlikely to win any fight.

The program in listing one is a simplified battle routine. The production of formulae related to the routine, such as Anger and Courage, should be done in another subroutine, before combat. The program line for anger in that routine would use the formula:

LET ANGER = (INT(STRESS + INTELLIGENCE + STRENGTH) /NOATT)

The formula finds the average of the three attributes between the brackets, NOATT being the variable number of attributes. As there are three attributes between brackets NOATT would contain '3'.

The INT function is used at the beginning of the formula to round the result, which would be 3.666, to an integer value. There is a deliberately designed bias in the Spectrum which rounds such numbers down. If, however, you do not want this bias you should add 0.5 to the end of the formula.

An example of its use within a program would be:

ANGER = (INT (5+4+2) /3)

which would equal '3' when rounded down.

Once all of those attributes have been set up you can move into the scenario which uses them. The example in listing one has been designed to stand alone and uses the attributes shown in figure one. Those are entered into an array, C, which is set up in the subroutine between lines 1 and 90. As was explained last month, by setting the data up in this way computer time and memory is saved.

If you used dozens of separate small arrays for each character Spectrum memory would quickly be eaten up and it is precious if you are programming a game such as The Crysan Incident. You may get confused with all the data when you start programming with the one array technique but you will soon get used to working with it.

The IF . . . THEN statements at lines 110 and 120 decide whether Kagan and Marla have sufficient strength to fight the two monsters. They use 'less than' and 'more than' conditional operators to achieve the effect.

Genghis and Boreel have no such options but you could alter the program to include more checks on the monsters.

Variable N$ on 110 and 120 acts as a status pointer which, until those lines are reached, contains nothing and was set up in line 2. If either of the two heroes are wounded and have strength levels below — 9 their names will be put into N$ and passed through to the subroutine at line 2000. The monsters will then have a chance to kill them, depending upon their attributes.

Skipping line 125 for a moment, we move on to the short routine at line 130. The line shows an alternative method of representing and combining lines 110 and 120. Both monsters are tested on strength using an OR conditional operator to separate them. If one of the monsters has a rating below −9 the program passes control to the subroutine at 3000.

Again we skip line 140 to look at a complex routine which starts at 160 and ends at 190. Line 160 compares anger, strength and agility of Kagan and the monster Boreel. If Kagan has stronger attributes then he wins the round and the LET statements at the end of that line are executed so that his anger is increased and his strength and agility are decreased. Control is then transferred to line 180 to test the other fighting pair.

If Boreel wins the encounter then control is transferred to line 170 where the monster's attributes are changed. Line 190 is used to change the attributes of Genghis if Marla loses her battle. Once all that has been sorted out the program loops back to line 100 where the whole process is run through again.

```
   1 REM FIGHT SCENE SUBROUTINE
   2 LET N$=""
   5 RESTORE 40
  10 DIM C(4,6)
  20 FOR K=1 TO 4
  30 FOR M=1 TO 6
  40 READ C(K,M)
  50 NEXT M: NEXT K
  60 DATA 5,3,7,9,4,3: REM KAGAN
  70 DATA 9,2,-4,9,-3,4: REM MAR
LA
  80 DATA 9,7,-2,-7,7,-3: REM BO
REEL
  90 DATA 6,7,-3,-7,5,-3: REM GE
NGHIS
 110 IF C(1,5)<-9 THEN  PRINT "K
AGAN CAN GO ON NO LONGER": LET N
$="KAGAN": GO SUB 2000: REM KAGA
N FINISHED OFF ?
 120 IF C(2,5)<-9 THEN  PRINT "M
ARLA CAN GO ON NO LONGER": LET N
$="MARLA": GO SUB 2000: REM KILL
 OFF MARLA ?
 125 LET G$=""
 130 IF C(3,5)<-9 OR C(4,5)<-9 T
HEN  GO SUB 3000: REM MONSTER KI
LL
 140 IF G$="STOP" THEN  STOP
 160 IF C(1,2)<C(3,2) AND C(1,3)
>C(3,3) AND C(1,5)<C(3,5) AND C(
1,6)<C(3,6) THEN  LET C(1,2)=C(1
,2)+1: LET C(1,5)=C(1,5)-1: GO T
O 200
 170 LET C(3,2)=C(3,2)+1: LET C(
1,5)=C(1,5)-1
 180 IF C(2,2)<C(4,2) AND C(2,3)
>C(4,3) AND C(2,5)<C(4,5) AND C(
2,6)<C(3,6) THEN  LET C(2,2)=C(2
,2)+1: LET C(2,5)=C(2,5)-1: LET
C(2,6)=C(2,6)-1: GO TO 200
 190 LET C(4,2)=C(4,2)+1: LET C(
4,5)=C(4,5)-1: LET C(4,6)=C(4,6)
-1
 200 GO TO 100
2000 REM MONSTER KILL
2010 IF C(3,5)>4 AND C(3,6)>5 AN
D C(3,6)>4 THEN  PRINT "BOREEL F
INISHES OFF ";N$: LET N$=N$+"X"
2020 IF C(4,3)>4 AND C(4,4)>5 AN
D C(4,6)>4 THEN  PRINT "GENGHIS
KILLS ";N$: LET N$=N$+"X"
2030 IF N$="KAGANX" THEN  LET C(
2,1)=C(2,1)-2: LET C(2,2)=C(2,2)
+2: REM MARLA'S ATTRIBUTES CHANG
E AS KAGAN DIES
2040 IF N$="MARLAX" THEN  LET C(
1,1)=C(1,1)-2: LET C(1,2)=C(12)+
2
2060 RETURN
3000 REM MONSTER KILL
3010 IF C(3,5)<-9 THEN  PRINT "B
OREEL IS DEAD"
3020 IF C(4,5)<-9 THEN  PRINT "G
ENGHIS IS DEAD": LET G$="STOP"
3030 RETURN
```

Listing One

The routine at line 2000 decides whether the monsters kill a character whose strength has gone below −9. If such a killing is made an 'X' is added to the character name stored in N$. Lines 2030 and 2040 use the new version of N$ to change the attributes of the character who remains alive. In the example he becomes more angry and his ego is deflated. Such interaction is simple but shows off the

continued on page 126

continued from page 125

potential of the system where an effect on one character can have a knock-on effect on others.

The last routine, starting at line 3000, checks on the monsters to see if they should die. The same depletion of strength which can kill the human characters will also kill off the monsters.

The G$ variable, first defined at line 125, comes into play in this subroutine. G$ is set to STOP if Genghis dies and on return to the main body of Basic code the computer will end the progam at line 140 if the monster is dead. Once past the monsters you will be able to guide your character into the yacht.

Although listing one includes many examples of character interaction techniques it can be improved. At the moment, for example, lines 110 and 120 will only put sentence of death on a character if strength is below −9. You could, however, also include agility in that IF . . . THEN statement using an OR condition. Life chances would then ebb away as both strength and agility left the body of the hero.

One aspect which has not been included, but was discussed last month, is the sword which lies beside the doorway of the yacht, behind the monster. The only two possibilities in the encounter, using LEP, are that one of the characters will cause a diversion while the other grabs the sword, or that they will get the sword after the two monsters have been defeated.

A simple addition to the Basic listing, will take care of the first possibility. All you have to do is test both characters on strength and agility. If one has values which lie at the top end of the scale, +5 to +10, they could go for the sword while the other diverts the monster. Adding those lines and a few PRINT statements into the program will give an intelligent feel to the adventure. It will also give Kagan and Marla a better chance of killing the monsters.

Objects such as the sword are easy to store and can be moved around in the keeping of adventurers with relative ease. Listing two shows one way of storing objects before they are picked up by players. Each scene will have a series of objects stored in a variable, which we will call b$. As the scene changes so does the contents of the variable. If there are no objects in a location an empty string will result.

	Kagan	Marla	Boreel	Genghis
Agility	+5	+9	−3	−3
Anger	+3	+2	+7	+7
Ego	+5	+9	+9	+6
Intelligence	+9	+9	−7	−7
Courage	+7	−4	−2	−3
Strength	+4	−3	+7	+5

Figure 1. New character traits.

Putting objects in one string instead of storing them in an array saves Spectrum memory. The format used is easy to understand and can be handled with a few lines of code by the computer.

The first part of an object entry within the string is an asterisk. It tells the computer that a new object follows. The second part is a one character key which tells the computer what type of object has been found. W means weapon, O means general object, and M means monster — if you want to treat monsters as objects. The first three characters are used to store the object so, for instance, sword would be 'SWO'.

Listing two sets up a string at line 10. the input at line 20 is concatenated to a three-character input so that the computer can search for objects in the string. If a '*' is found by line 50 a new object entry has been found; if not a loop is made to line 90 where the scan of the string continues character by character.

Line 100 compares object entries when found and passes the entry to the routine at lines 120 to 140 where a test is made for the type of object and the user informed of that type. If an object is not found 60 informs the user and returns for the input of another object name.

Once Kagan and Marla have found the object and passed the monster they go through the doorway. A brilliant white light engulfs them and they find themselves in the underground kingdom of Kelros. They are captured by a party of Kelrosians and have to talk their way out of a sticky situation as they approach the Kelrosian city, Carvad.

Which brings me to the subject of the next article: communication. Next month I will introduce ways in which the Spectrum and QL can understand English sentences and how other characters, played by the computer, can talk back.

```
   10 LET b$="*wswo*oorb*orope*mG
enghis*mBoreel"
   20 INPUT a$
   25 LET c$=a$(1 TO 3)
   30 LET k=1
   50 IF b$(k)="*" THEN  GO TO 90
   60 IF k=LEN (b$) THEN  PRINT "
Not found": GO TO 20
   70 LET k=k+1
   80 GO TO 50
   90 LET m=k+2: LET c=m+2
  100 IF c$=b$(m TO c) THEN  GO T
O 120
  110 GO TO 70
  120 IF b$(k+1)="w" THEN  PRINT
a$;":";" You have found a weapon
."
  130 IF b$(k+1)="o" THEN  PRINT
A$;":";" You have found an objec
t."
  135 IF b$(k+1)="m" THEN  PRINT
a$;":";" A monster stands before
 you."
  140 GO TO 20
```

Listing Two

If at first you don't succeed...

Learning machine code is not as simple as you might think. Andrew Hewson explains



● *Please address problems and queries to Andrew Hewson, Helpline, Graham Close, Blewsbury, Oxfordshire.*

JOHN PRATT of Exeter writes: **I am trying to learn about Spectrum machine code programming. I notice that appendix one of the manual lists numeric codes for each Basic keyword. If I poke those codes into memory will I get a machine code program instead of a Basic one?**

Definitely not! Appendix one is misleading for the newcomer because it lists the decimal numbers 0 to 255 against their hexadecimal equivalents, the Basic keywords and ASCII and graphic characters, and the Z80 assembly language mnemonics. Therefore it is not surprising that some people, like John, expect the various items to be interchangable.

The interpretation of the contents of a memory location can be any of the things listed in appendix one — and a few more besides — and the correct interpretation depends on the context in which the contents occur.

A single memory location can contain a single whole positive number lying in the range 0 to 255 inclusive. Sometimes, in the correct context, the computer may interpret the contents in just that fashion — a simple whole number. In another context it might be interpreted as the code for a keyword, in yet another it might represent a part of a Basic line number and it might even represent an instruction in a machine code program. The context is all important in determining which interpretation is correct.

As users of the English language we should not be surprised at this. We are all adept at selecting which of the three meanings is implied when the words "two", "to" and "too" are uttered. In speech those words sound more or less identical but we automatically select the correct version in any given sentence from the context of the word. We also manage, when reading text, to distinguish words which have the same spelling and similar meanings but are pronounced differently.

Peter Wainwright of Winchester writes: **I am interested in machine code programming and I have bought some books on the subject but I am finding it hard to get started. Have you any advice?**

Most people find they are able to develop a reasonable proficiency at Basic by studying the manual and by reading books and magazine articles. Not surprisingly they assume that machine code programming is only a little more difficult and it comes as a nasty shock when they find that they get bogged down very early on.

I think that the reason for that is that it is not generally appreciated that machine code is as different from Basic as English is from the Morse Code. The structures of the languages are completely different because they have different reasons for existence.

```
10   FOR I=0 TO 767
20   POKE 22528+I,INT(I/3)
30   NEXT I
100  LET A=22528
110  LET B=23295
120  LET D=1
130  FOR I=A TO B STEP D*32
140  LET S=PEEK I
150  FOR J=I TO I+D*30
160  POKE J,PEEK (J+D)
170  NEXT J
180  POKE I+D*31,S
190  NEXT I
```

Table 1. A Basic program to scroll the Spectrum attributes from right to left.

To scroll the attributes from left to right alter lines 100, 110 and 120 as follows:

```
100  LET B=22528
110  LET A=23295
120  LET D=-1
```

Basic is a so-called high level language and is specifically designed to use words taken from the English language and use them in a context which is similar to English. Basic shares some features with other high level languages like Fortran, Pascal and Algol and a programmer trained in one language can usually transfer to another with reasonable ease.

In a sense, Basic, Fortran, Algol and Pascal are as closely related to one another as English, French, Spanish and Italian.

In contrast, machine code is not a human-like language at all. Rather it is the fundamental patterns which force the microprocessor to perform a given instruction. Some of those tasks resemble commands in high level languages in which case a word or two is borrowed to produce a mnemonic for the machine code. For example the code '201' causes the Z80 microprocessor to retrieve an address stored previously and take its next instruction from that address. In a sense this is like the RETURN command in Basic in which a previously stored Basic line number is retrieved and execution continues from that line number. Because of that similarity the assembly language mnemonic for '201' is "ret", an abbreviation of 'return'.

Hence the best advice when tackling machine code programming for the first time is to approach the subject with an open mind and not give up if the subject appears to be tougher than you expected.

Joseph Bonefante of Gibraltar writes: **I want to find out how to scroll the Spectrum screen either in Basic or machine code. Can you suggest a method?**

The Spectrum display is bit mapped from the 6K display file to the screen that is, the screen is divided into 256 × 192 = 49152 pixels and each bit of

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each of the bytes in the display file determines whether one pixel is illuminated. There are eight bits in each byte, 6144 bytes in the display file and 8 × 6144 = 49152 so for each bit there is one corresponding pixel.

The display file is held at the bottom of RAM between addresses 16384 to 22527 inclusive. If the number 255 is POKEd into a location in that area of RAM a short horizontal line appears on the screen. For example

POKE 16384,255

causes a line to appear at the top of the first character position at the top left-hand corner of the screen. There are no breaks in the line because all the eight bits are set in a memory location containing 255. Thus the length of the line is

1 byte = 8 bits = 8 pixels

Any other number POKEd into the display file will cause a broken short horizontal line to appear on the screen. A regular broken line can be produced by POKEing 170 or 85.

The order in which the mapping takes place from the display file to the screen can be seen using a loop of the form:

```
10 FOR I = 16384 TO 22527
20 POKE I,255
30 NEXT I
```

This loop POKEs 255 into each memory location in the display file in turn. When it is RUN the screen fills with horizontal bars which gradually cover the screen as the loop proceeds.

The first line appears at the top of the screen, the second appears eight locations below it and so on until there are eight bars in the screen. The ninth bar appears below the first, the tenth bar below the second .... and finally the seventeenth appears below the tenth. That method of stepping down the screen is repeated until the top third is completely filled. The second third and the final third are drawn in the same way.

The same effect can be seen if a copy of the display is LOADed from cassette using the SCREEN$ command.

The display file only controls the illumination of each pixel. The colour information is held in the attributes file which occupies locations 22528 to 23295 inclusive in RAM. Thus the attributes file immediately follows the display file. POKEing a number into the attributes file will cause the status of the INK, PAPER, FLASH and/or BRIGHT of a entire character position to alter. The following routine fills the screen with characters and then sets them one by one to flash in magenta on red:

```
10 FOR I = 1 TO 22
20 FOR J = 1 TO 32
30 PRINT CHR$ (J + 47);
40 NEXT J
50 NEXT I
60 FOR I = 22528 TO 23295
70 POKE I,147
80 NEXT I
```

The order in which the attributes are mapped to the screen is, as one might expect, starting at the top left and working from left to right down the screen. Thus it is a straightforward matter to write a Basic program to scroll the attributes. An example is shown in table one. Scrolling the Spectrum display file is rather more difficult and whilst it is quite possible to write routines in Basic they would have little practical value because the large number of memory locations to be manipulated would make them very slow. Hence machine code routines are more or less essential.

If a fast but rather jerky scroll is acceptable then each byte of a display line can be transferred to left or right in an analogous manner to the method used for scrolling the attributes. Remember however that eight bytes are used to determine the form of each character position.

If a smooth scroll is required then the contents of each byte must be rotated, one bit at a time, to right or left. After each rotation the final bit is displaced altogether and can be transferred to the next byte via the carry flag. Fortunately the Z80 machine language is well supplied with suitable byte rotation instructions.

Thus there are at least 12 ways of scrolling the Spectrum display — both the attributes and the display file can be scrolled character by character, and the display file can also be scrolled pixel by pixel. Each mode can also be scrolled in all four directions and by calling two routines one after the other diagonal scrolling can be achieved.

It is not practical to list all 12 routines so I have included just two examples as listed in table two. The examples were written by my colleague John Hardman and they illustrate the basic principles.

The routines can be loaded using an assembler or a simple decimal loader such as the following which POKEs each number in turn into the printer buffer:

```
10 LET I = 23296
20 INPUT J
30 PRINT I,J
40 POKE I,J
50 LET I = I + 1
60 GOTO 10
```

To call the routine enter:

RAND USR 23296

Assembly code	Numbers to enter	Comment
		Right scroll by one character
ld hl,22527	33 255 87	End of display
ld d,0	22 0	
ld a,192	62 192	No of lines
ld b,31	6 31	32 characters per line
dec hl	43	Previous byte
ld e,(hl)	94	into e
inc hl	35	and back to
ld (hl),e	115	display
dec hl	35	Repeat for entire
djnz −7	16 249	line
ld (hl),d	114	Fill final byte
dec hl	43	Repeat for
dec a	61	each line
jr nz,−14	32 242	
ret	201	Return
		Left scroll by one pixel
ld hl,22527	33 255 87	End of display
ld c,192	14 192	No of lines
ld b,32	6 32	32 characters per line
or a	183	Clear carry
rl (hl)	203 22	Rotate left
dec hl	43	Previous byte
djnz −5	16 251	Next byte
dec c	13	
jr nz,−11	32 245	Next line
ret	201	Return

Table 2. Two machine code routines to scroll the display file right by one character and left by one pixel respectively.



If we have reviewed a program we have given it a rating known as the Gilbert Factor, named after our Software editor, John Gilbert. That factor includes clarity of instructions, speed of operations, ease of use, originality, lasting appeal, use made of graphics and sound, and success in accomplishing stated aims.

ZX-81

Adventure

Adventure	Bug-Byte	6
Adventure	Gavin Barker	6
Black Crystal	Mastervision	7
Espionage Island	Artic	*
Greedy Gulch	Phipps	7
Inca Curse	Sinclair	*
Lost Island	JRS	*
Magic Mountain	Phipps	*
Merchant of Venus	Crystal	7
Pharaoh's Tomb	Phipps	*
Pimania	Automata	6
Secret Valley	New Soft	*
Serpents Tomb	Vortex	*
Ship of Doom	Artic	7
Time Bandits	New Soft	*
Trader Trilogy	Quicksilva	6
Volcanic Dungeon	Mastervision	5
World of Illusions	Contrast	4

Arcade

Alien Dropout	Silversoft	*
Asteroids	Silversoft	8
Asteroids	Software Farm	6
Bank Robber	Romik	6
Bears in the Wood	Unicorn	6
Bubble Bugs	Romik	6
Byter	Protek	*
Cassette 1	Orwin	7
Cassette 2-5	Orwin	7
City Patrol	Sinclair	7
Damper	Quicksilva	7
Defenda	Quicksilva	8
Door Slammer	Cathedral	7
Forty-Niner	Software Farm	9
Froggy	DJL	7
Full-screen Breakout	New Generation	*
Galactic Trooper	Romik	
Galaxians	Quicksilva	6
Galaxy Jailbreak	Romik	6
Games Tape 1	J K Greye	*
Games Tape 2	J K Greye	*
Games Tape 3	J K Greye	*
Gamestape 1	Fawkes Computing	7
Glooper	Quicksilva	7
Gloops	Quicksilva	5
Gobbler	Software Farm	*
Grand Prix	dk'tronics	*
Hang Glider	S Electronics	6
Hickstead	CCS	5
Invaders	Bug-Byte	5
Invaders	Selec	7
Krazy Kong	PSS	*
M. Mouse goes de-bugging	Lothlorien	7
Maze Death Race	PSS	*
Mazogs	Bug-Byte	8
Micro Mouse	Lothlorien	7
Namtir Raiders	Artic	8
Night Gunner	Digital Integration	5
Rocket Man	Software Farm	7
Sabotage	Sinclair	6
Space Raiders	Sinclair	*
Space Trek	JRS	*
3D Monster Maze	New Generation	9
Three Games Cassette	McGraw Hill	8
Zuckman	DJL	8
ZX Invasion Force	Artic	*
ZX Panic	Selec	4
ZX-81 1K Games Pack	Crystal	9
ZX-81 Pocket Book	Phipps	*

Business

Accounts (Limited company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Business Bank Account	Transform	*
Critical Path Analysis	Hilderbay	6
Draft	Myrmidon	*
Mailing List	Hestacrest	*
Payroll	Hilderbay	*
Payroll	Soft Tech	*
Payroll	V&H Computing	*
Personal Banking System	Hilton	*
Purchase Ledger	Hestacrest	*
Sales Day Book	Transform	*
Sales Ledger	Hestacrest	*
Text	Contrast	8

Education

Binary Brains	Pooter	5
Four Rules of Number	Micro Master	*
Integration	University	8
Intermediate English 1-2	Rose	*
Language Devel. Series	Glasson	*
Language Devel. Series	Micro Master	*
Linear Programming	University	*
Matrix Operations	University	7
O Level Chemistry	Calpac	*
O Level French Revision	Rose	*
O Level Maths Revision	Rose	*
Primary Arithmetic	Rose	*
Regression	University	*
Self teach Program	Anvil	*

Language

Forth	Sinclair	7
ZX Forth	Artic	8

Practical

Ephemeris	Bridge	7
Poolster	Naigram	3

Puzzle

Nowotnik Puzzle	Phipps	*
Word Fit	Ram Writer	6

Simulation

Flight Simulation	Sinclair	6
Pilot	Hewson	7
Print Shop	CCS	*

Strategy

Airline	CCS	7
Auto Chef	CCS	7
Battleships	JRS	*
Conflict	Martech	7
Cyborg Wars	Stratagem	7
Dallas	CCS	6
Dictator	Bug-Byte	7
Fighter Pilot	Digital Integration	5
Football Manager	Addictive Games	7
Fort Apache	Contrast	8
Galaxy Conflict	Martech	8
Ocean Trader	Quicksilva	7
Pioneer Trail	Quicksilva	7
Racehorse Trainer	G Barker	6

Traditional

Do Not Pass Go	Work Force	*
Lynchmob	Bridge	6
ZX 1K Chess	Artic	*
ZX Compendium	Mastervision	7
ZX-Chess 1	Artic	*

Utility

Graphics	IPA	*
Graphics Toolkit	JRS	9
HI Resolution	CRL	6
Machine Code Test Tool	OCP	*
MCoder	PSS	8
Programme Enhancement		
Renumber Delete	Work Force	*
Trace	Texgate	7
ZX Compiler	Silversoft	*
ZX Screenkit	Picturesque	*
ZX-Bug	Artic	*
ZXAS	Bug-Byte	*

SPECTRUM 16K

Adventure

Android One	Vortex	*
Escape	New Generation	8
Moria	Severn	*
Planet of Death	Artic	6
Secret Valley	New Soft	*
The Great Western	New Soft	*
Time Bandits	New Soft	*

Arcade

Aquarius	Bug-Byte	6
Arcadia	Beau Jolly	5
Arcadian	J K Greye	6
Assassin	Spectrasoft	*
Avenger	Abacus	5
Baron	Temptation	*
Black Hole	Quest	6
Blind Alley	Sunshine	7
Caterpillar	CDS	*
Cavern Fighter	Bug-Byte	4
Centi-Bug	dk'tronics	*
Children's Compendium	Dymond	*
City Defence	Mikro-Gen	*
Colour Clash	Romik	4
Cookie	Ultimate	*
Cosmic Guerilla	Crystal	8
Crazy Cranes	Voyager	5
Creepy Crawler	Mikro-Gen	*
Crevasse and Hotfoot	Microsphere	7
Cruising	Sunshine	4
Cyber Rats	Silversoft	7
Death Chase	Micromega	6
Demolition	Comp. Rentals	*
Destroyer	Winters	*
Di-lithium Lift	Hewson	3
Doombugs	Work Force	8
Dymonoids	Dymond	*
Earth Defence	Artic	5
Ed-On	Add-On	4
Eskimo Eddie	Ocean	*
Family Games Pack	Hornby	*
Fireflash	Abacus	5
Fruit Machine	dk'tronics	6
Galactians	dk'tronics	*
Galactic Trooper	Romik	3
Galactic Warriors	Abacus	6
Galaxians	Artic	6
Ghost Hunt	PSS	*
Gnasher	Mastertronic	4
Gobble-a-Ghost	CDS	*
Gobbleman	Artic	*
Godzilla and Martians	Temptation	7
Ground Attack	Silversoft	6
Gulpman	Campbell	*
Haunted Hedges	Micromega	6
Hopper	PSS	6
Horace and the Spiders	Sinclair	8
Horace Goes Skiing	Sinclair	8
Hungry Horace	Sinclair	8
Invasion Force	Artic	8
It's the Wooluf	Crystal	5
Jet Pac	Ultimate	8
Luna Crabs	Micromega	7
Magic Meanies	CDS	2
Maze Chase	Hewson	8
Meteor Storm	Quicksilva	7
Meteoroids	dk'tronics	7
Meteoroids	Softek	6
Micro Mouse	Lothlorien	6
Millypede	Add-on	7
Mined Out	Quicksilva	7
Moon Buggy	Visions	6
Mr Wong's Loopy Laundry	Artic	6
Muncher	Silversoft	6
Nanas	Mikro-Gen	*
Orbiter	Silversoft	7
Ostron	Softek	*
Pengy	Micromania	4
Planetoids	Sinclair	8
Proteus	Abacus	5
Rapedes	Visions	*
Repulsar	Softek	*

Rider	Virgin	6
Road Toad	dk'tronics	7
Robot Panic	Soft Mill	1
Sam Spade	Silversoft	5
Santa	Artic	*
Sentinel	Abacus	7
Shark Attack	Romik	5
Sheer Panic	Visions	7
Sir Lancelot	Melbourne House	7
Slippery Sid	Silversoft	8
Space Intruders	Quicksilva	7
Space Raiders	Sinclair	6
Space Zombies	Mikro-Gen	*
Spec. Invaders	Artic	*
Spec. Scramble	Work Force	7
Spectipede	Mastertronic	5
Spectral Invaders	Bug-Byte	8
Spectral Panic	Hewson	5
Spectres	Bug-Byte	6
Strike Four	Spectresoft	4
Styx	Bug-Byte	7
Sub	Romik	*
Tank Battle	dk'tronics	8
3D Monster Chase	Romik	3
Train Game	Microsphere	9
Trom	dk'tronics	4
Vortex	JK Greye	5
Winged Warlord	CDS	6
Yomp	Virgin	7

Business

Finance Manager	OCP	9
Masterfile 16	Campbell	*
Matcalc	Work Force	*
Micropen	Contrast	*
Vu-Calc	Sinclair	7
Vu-File	Sinclair	8

Education

Alphabet Games	Sinclair	*
Apostrophe	Sinclair	7
Ballooning	Heinemann	*
Calpac 1-3	Calpac	*
Car Journey	Heinemann	*
Cargo	Sinclair	*
Chess Tutor	Artic	7
Counting	Widget	*
Education One	Lerm	*
Educational	Startersoft	*
Estimator Racer	Psion	8
Firework Music	Soft Cottage	8
40 Educational Games	Granada	*
Four Rules of Number	Micro Master	*
French Voc Test	Tutorial	*
Hidden Letters	Poppy	*
Hot Dot Spotter	Longman	*
Integration	University	8
Intermediate English 1-2	Rose	*
Know Your Tables	Collins	*
Language Devel. Series	Micro Master	*
Learn Basic	Logic 3	*
Marks Book	Lerm	*
Maths Invaders	Stell	*
Matrix Operations	University	7
Money	Poppy	7
Night Sky	Bridge	*
Number Painter	Psion	7
O Level Maths	Homestudy	*
O Level Physics	Homestudy	*
Paddington's Shopping Mix-up	Collins	*
Pathfinder	Widget	*
Polynomials	University	8
Primary Arithmetic	Rose	*
Punctuation Pete	Heinemann	*
Regression	University	8
Self-teach Program	Anvil	*
Shape Sorter	Widget	*
Special Agent	Heinemann	*
Spellbin	Startersoft	*

Language

Beta Basic	Betasoft	9

Practical

Biorhythms	Spectrasoft	*
Countries of the World	Hewson	8
Cycle Planner	Medidata	4
Map of the UK	Kuma	7
Spectrasort	Spectradraw	4

Puzzle

Flippit	Sinclair	7
Hanoi King	Contrast	7
Lojix	Virgin	3
Nowotnik Puzzle	Phipps	7
Quazar	Rose	4

Simulation

Air Traffic Controller	Hewson	6
Airliner	Protek	6
Golf	R & R	7
Golf	Virgin	7
NightFlite	Hewson	5
Print Shop	CCS	8
Pro-Golf	Hornby	7

Strategy

Auto Chef	CCS	*
Big Match Soccer	Winters	*
Dallas	CCS	6
Dictator	dk'tronics	*
Football	Winters	*
Heathrow	Hewson	8

Traditional

Backgammon	Hewson	*
Bridge Tutor	CP Software	8
Bridgemaster	Serin	9
Challenge	Temptation	*
Gambling Tape	Dymond	*
Las Vegas	Temptation	5
Othello	CP Software	*
Pinball	Winters	*
Pool	Bug-Byte	7
Reversi	Sinclair	8
Spec. Microchess	Artic	*
Super Play 1	Video Soft	*
Tennis	Winters	*

Utility

Aspect	Bug-Byte	5
Audio Sonics	Work Force	4
Auto Sonics	Buttercraft	5
Basic Utilities	Jaysoft	6
Character Generator	Spectrasoft	*
Dietron	Custom	6
Disassembler	dk'tronics	7
Display	Work Force	*
Editor/Assembler	Picturesque	8
Extended Basic	CP Software	7
FP Compiler	Softek	9
Friendly Face	Monitor	7
Keysounder	S and G	*
Letterfont	Allanson	8
Machine Code Test Tool	OCP	7
Master Toolkit	OCP	7
MCoder	PSS	8
Micropen	Contrast	*
Print Utilities	Sinclair	7
Renumber Delete	Work Force	*
Slow Loader	ELR	9
Sound FX	dk'tronics	6
Spec. Editor/ Assembler	Picturesque	8
Spec. Monitor	Picturesque	7
Spectrum Super Toolkit	Nectarine	8
Spectsound	PDQ	2
Supercode	CP	8
Taswide-64	Tasman	*
Trace	Texgate	8
TT-S	Timedata	8
ZX Spectrum Assembler	McGraw Hill	4
ZXED	dk'tronics	*

SPECTRUM 48K

Adventure

Abyss	CCS	6
Ace in the Hole	Add-on	*
Adventure 1	Abersoft	6
Alchemist	Beau Jolly	7
Arcane Quest	Add-on	*
Arrow of Death (1 & 2)	Channel 8	6
Assignment East Berlin	Sterling Software	3
Atlas Assignment	Virgin	7
Black Crystal	Mastervision	7
Black Planet	Phipps	7
Buffer Adventure	Buffer Micro	6
Castle	Bug-Byte	*
Castle Blackstar	SCR	7
Circus	Channel 8	8
Classic Adventure	Melbourne House	*
Colditz	Phipps	8
Colossal Caves	CP Software	8
Danger Mouse in The Black Forest Chateau	Creative Sparks	8
Demon Lord	MCE	5
Detective	Arcade	7
Diamond Quest	CCS	4
Diamond Trail	Gilsoft	7
Doomdark's Revenge	Beyond	9
Dragonsbane	Quicksilva	6
Dungeon Master	Crystal Comp.	8
Dungeons of Doom	Temptation	3
Erik the Viking	Level Nine	8
Espionage	Modular Resources	4
Espionage Island	Artic	5
Eureka	Domark	8
Everest Ascent	Shepherd	6
Eye of Bain	Artic	7
Faerie	8th Day	6
Fantasia Diamond	Hewson	7
Flight from the Dark	Hutchinson	8
Frog Face	Positive Image	7
Ghoulies	IMS Software	7
Golden Apple	Artic	7
Gorgon	Phipps	*
The Great Space Race	Legend	3
Halls of Things	Crystal Comp.	9
Hampstead	Melbourne House	8
Here comes the sun	Alligata	7
Hobbit	Melbourne House	9
Horror Atoll	Add-on	*
Ice Station Zero	8th Day	5
Inca Curse	Artic	6
Inferno	Shepherd	7
Invincible Island	Shepherd	7
Island	Crystal	4
Island	Virgin	7
Jericho Road	Shards	7
Jungle Adventure	CCS	4
Kentilla	Micromega	6
King Arthur's Quest	Hill MacGibbon	4
Knight's Quest	Phipps	6
Legend	Century Software	6
Leopard Lord	Add-on	4
Lords of Midnight	Beyond	9
Lords of Time	Level Nine	8
Lost Over Bermuda	Add-on	*
Mad Martha	Mikro-Gen	7
Mad Martha II	Mikro-Gen	*
The Magic Sword	Database Pubs	5
Mountains of Ket	Incentive	8
Murder at Manor	Gemtime	7
Mysterious Fairground	Buffer Micro	6
Odyssey of Hope	Martech	6
Oracle's Cave	Doric	8
Orc Slayer	Gamma Software	5
Paradox	Runesoft	2
Perseus and Andromeda	Channel 8	7
Peter Pan	Hodder & Stoughton	6
Pimania	Automata	7
The Prince	CCS	8
The Prisoner	Spoof Software	6
Project X	Compass Software	7
Quest	Hewson	7
Quetzalcoatl	Virgin	8
Return to Eden	Level Nine	8
Roundsby Incident	Add-on	*
Runes of Zendos	Dorcas Software	6
The Sandman Cometh	Star Dreams	7
Satan's Pendulum	Minatron	7
Se-Kaa of Assiah	Mastervision	3
Sherlock	Melbourne House	9
Ship of Doom	Artic	7
Solaris	Softel	*
Spoof	Runesoft	7
Superspy	Shepherd	5
System 15000	Craig Communications	9
Temple of Vran	Incentive	8
Terror from The Deep	Add-on	*
The Final Mission	Incentive	7
The Wild Bunch	Firebird	3
Tir Na Nog	Gargoyle	9
Titanic	R&R	5
Tower of Despair	Games Workshop	5
Transylvanian Tower	Shepherd	7
Twin Kingdom Valley	Bug-Byte	8

Urban Upstart	Shepherd	*
Valhalla	Legend	7
Vampire Village	Terminal	4
Velnor's Lair	Quicksilva	8
Volcanic Dungeon	Mastervision	6
War of the Worlds	CRL	4
Waydor	IMS Software	3
Width of the World	Mosaic	4
Ziggarat of Dread	Add-on	*

Arcade

Ad Astra	Gargoyle Games	8
Adven. of a St Bernard	Mastertronic	7
Airwolf	Elite	3
Alcatraz Harry	Mastertronic	3
Android Two	Vortex	*
Ant Attack	Quicksilva	8
Antics	Bug-Byte	8
Arena 3000	Microdeal	5
Armageddon	Silversoft	3
Astroplanner	Romik	2
Atic Atac	Ultimate	8
Automania	Micro-Gen	6
Avalon	Hewson	9
Backpacker's Guide to the Universe	Fantasy Software	6
Base Invaders	Work Force	6
Battle Zone	Quicksilva	5
Beach Head	US Gold	8
Bear Bovver	Artic	8
Bewarehouse	Positive Image	4
Birds and Bees	Bug-Byte	8
Black Hawk	Creative Sparks	7
Blade Alley	PSS	6
Blue Thunder	Foundry Systems	6
Booty	Firebird	7
Boulder Dash	Front Runner	5
Bubble Trouble	Arcade	*
Bugaboo	Quicksilva	7
Butterfly	Pulsonic	4
Buzz Off	Electric	5
Caesar the Cat	Mirrorsoft	7
Carnival	Eclipse	5
Carpet Capers	Terminal	7
Cavelon	Ocean	7
Centipoid Plus 3	Orwin	5
Chequered Flag	Sinclair	8
Chinese Juggler	Ocean	5
Chuckie Egg	A & F	8
Chuckman	CCI/Add-on	8
Close-In	Pulsonic	4
Codename Mat	Micromega	9
Corridors of Genon	New Generation	9
Cruise Attack	Mikro-Gen	*
Crusoe	Automata	5
Cyber Zone	Crystal	*
Cyclone	Vortex	8
Daley Thompson's Decathlon	Ocean	8
Dangermouse in Double Trouble	Creative Sparks	8
Death Chess 5000	Artic	7
Defenda	Interstella	2
Deffendar	Mikro-Gen	*
Defusion	Incentive	6
Defusion/Worms	K-Tel	3
Demon Chase	Mansfield	4
Deus Ex Machina	Automata	9
Devil Rides In	Mastertronic	7
Dimension Destructors	Artic	8
Dinky Digger	Postern	4
Dodge City	Phoenix	7
Dr Franky and the Monster	Virgin	6
Dragonfire	Cheetahsoft	5
Driller Tanks	Sinclair	3
Energy 30,000	Elm	3
Eric and the Floaters	Sinclair	6
Eskimo Eddie	Ocean	4
Exodus	Firebird	3
Frank N Stein	PSS	7
Fred	Quicksilva	6
Freez Beez	Silversoft	*
Froot Loop	NTD Software	5
Galaxy Attack	Sunshine	4
Ghostbusters	Activision	7
Ghost Rider	Positive Image	4
Giant's Revenge	Thor	3
Gift from the Gods	Ocean	6
Gilligan's Gold	Ocean	6
Glug Glug	CRL	6
H. Dumpty and the F. Wuzzies	Artic	5
Havoc	Dynavision	2
Harry Goes Home	Pulsonic	6
Hickstead	CCS	4
High Noon	Work Force	9
House of Living Dead	Phipps	*
Hunchback	Ocean	7
Invasion Body Snatch.	Crystal	9
Jack and the Beanstalk	Thor	5
Jackpot	Comp. Rentals	*
Jasper	Micromega	6
Jet Set Willy	Software Projects	9
Jump Challenge	Martech	6
Killer Knight	Phipps	5
Knight Lore	Ultimate	9
Knight Rider	Hewson	*
Kokotoni Wilf	Elite	6
Kosmic Kanga	Micromania	5
Krakatoa	Abbex	8
Krazy Kong	PSS	*
Kung-Fu	Bug-Byte	6
Laser Zone	Quicksilva	8
Laserwarp	Mikro-Gen	6
Lazatron	Contrast	*
Les Flics	PSS	6
Lode Runner	Software Projects	6
Loony Zoo	Phipps	6
Lunar Jetman	Ultimate	8
Magic Roundabout	CRL	4
Manic Miner	Bug-Byte	9
Matrix	Salamander	7
Maze Death Race	PSS	*
Maziacs	dk'tronics	8
Metagalactic Llamas	Salamander	8
Mission Impossible	Silversoft	6
Mission Omega	Pulsonic	4
Monkey Biznes	Artic	7
Moons of Tantalus	Cornhill	5
Mr Wimpey	Ocean	7
Mummy Mummy	Lothlorien	6
Munnery's Mergatroids	Abacus	6
New Cylon Attack	A'N'F	5
Night Gunner	Digital Integration	6
1994	Visions	4
Olympimania	Automata	6
Orion	Software Projects	5
Pedro	Beau Jolly	7
Penetrator	Melbourne House	7
Pi-Balled	Automata	7
Pi-Eyed	Automata	6
Pingo	Profisoft	6
Pitfall II	Activision	5
Potty Pigeon	Gremlin Graphics	6
Psi-Spy	Postern	5
Pssst	Ultimate	7
Psytron	Beyond	9
Pyjamarama	Mikro-Gen	8
Pyramid	Fantasy	8
Raider Cursed Mine	Arcade	*
Rapscallion	Bug-Byte	6
Reactor	Gemini	7
Rescue	Comp. Rentals	*
Rescue	Ocean	*
Revenge of the Killer Tomatoes	Visions	6
Rider	Virgin	6
River Rescue	Creative Sparks	3
Robot Riot	Silversoft	6
Rommels Revenge	Crystal	8
Sabre Wulf	Ultimate	8
Skooldaze	Microsphere	8
Scuba Dive	Durrell	9
Security Shelter	Add-on	*
Select 1	Computer Records	
	Various	7
Skull	Games Machine	5
Snowball	Level 9	9
Sorcery	Virgin	7
Space Station Zebra	Beyond	6
Spectron	Virgin	6
Spellbound	Beyond	7
Splat	Incentive	8
Sports Hero	Melbourne House	6
Stagecoach	Creative Sparks	7
Starbike	The Edge	6
Stop the Express	Sinclair	8
Strangeloop	Virgin	9
Submarine Strike	Pulsonic	6
Tachyon Command	Century Software	2
Tank Trax	Mastertronic	3
Technician Ted	Hewson	7
Terrahawks	CRL	5
The Guardian	PSS	6
The Pyramid	Fantasy	7
The Snowman	Quicksilva	8
3D Bat Attack	Cheetahsoft	6
3D Lunattack	Hewson	6
3D Seiddab Attack	Hewson	5
3D Star Wars	Add-on	1
3D Tank Duel	Real Time	6
3D Tunnel	New Generation	9
Tiler Tim	Microwish	6
Time Gate	Quicksilva	8
Timebomb	CDS	7
Tobor	Add-on	7
Tornado Low Level	Vortex	8
Tranz Am	Ultimate	*
Trashman	New Generation	8
Travel with Trashman	New Generation	7
Traxx	Quicksilva	7
Tribble Trubble	Software Projects	8
Trom	dk'tronics	4
Turtle Timewarp	Softstone	4
Tutankhamun	Micromania	8
Two-Gun Turtle	Lothlorien	7
Underwurlde	Ultimate	8
Warlock of Firetop Mountain	Penguin	*
Wheelie	Microsphere	7
Worm Attack	Pulsonic	2
Worse Things Happen at Sea	Silversoft	7
Wrath of Magra	Mastervision	8
Xadom	Quicksilva	4
Zenji	Activision	8
Zig-Zag	dk'tronics	7
Zipper Flipper	Sinclair	4
Zombie Zombie	Quicksilva	7

Business

Accounts (Limited Company)	Hestacrest	*
Accounts (Sole Trader)	Hestacrest	*
Address Manager	OCP	7
Bank Account System	K Gouldstone	8
Bank Verifier	SD Micro	*
Business Bank Account	Transform	*
Cash Controller	Shepherd	7
Collector's Pack	Sinclair	7
Critical Path Analysis	Hilderbay	*
Database	Microl	7
DIY Book-keeping	RAMTOP	*
Electric Office	Fisher Software	4
Heathplanner	Heath Computing	7
Home Budget	Kuma Computers	5
Investment, Insurance, Information	Inform	5
Invoicing/Accounting	Transform	8
Keyfile	Keysoft	7
Masterfile	Campbell	8
Micropen	Contrast	5
Money Manager	Creative Sparks	6
Multi-File	ISP	6
Omnicalc	Microsphere	9
Payroll	Transform	*
Personal Banking System	Hilton	*
Personal Financ. Profile 2	McGraw-Hill	6
Projector 1	McGraw-Hill	8
Management Syst.	Fulwood	*
Sales Day Book	Transform	*
Sales Ledger	Hestacrest	8
Small Business Accounts	Sinclair	*
Spectext	McGraw Hill	7
Spreadsheet	Microl	7
Stock Control	Hilderbay	*
Stock Control	Transform	*
Tasword	Tasman	8
Tasword II	Tasman	9
Utility File	SD Micro	*
Va£Track	Morley Davies	7
Word Processor	Quicksilva	2

Education

ABC Liftoff	Longman	*
Angle	Chalksoft	5
Angle Turner	Arnold Wheaton	7
Astro Maths	Scisoft	6
Biology	Longman	7
Blockbuster	Compusound	7

Castle	L'Ensouleiado	7
Castle of Dreams	Widgit	7
Castle Spellerous	Sinclair	8
Chess Tutor 1	Sinclair	7
Clown	Englefield Software	4
Cortes	L'Ensouleiado	6
Countabout	Longman	*
Disease Dodgers	Sinclair Research	9
Dyslexia Beater	Dunitz	8
Eiffel Tower	Chalksoft	6
Electronic Learner's Guide No. 1	ETST	6
French	Longman	8
French is Fun	CDS	5
French Voc Test	Tutorial	*
Friend or Foe	Longman	6
Viking Raiders	Firebird	6
German is Fun	CDS	8
German Master	Kosmos	*
Guitar Tutor 1	Harlequin	*
Guitar Tutor 2	Harlequin	*
Highway Code	Learning Systems	6
Highwire	Englefield Software	4
Hotline	Chalksoft	5
Humpty Dumpty	Widget	8
Inkosi	Chalksoft	5
Jungle Jumble	Clever Cloggs	*
Jungle Maths	Scisoft	*
Learn to Read 1-5	Sinclair	7
Letters and Numbers	Jimjams	*
Linkword	Silversoft	6
Look Sharp	Mirrorsoft	7
Macman in the Treasure Caves	Sinclair Research	6
Macman's Magic Mirror	Sinclair Research	8
Magnets	Sinclair	*
Make-a-Chip	Sinclair	*
Mansfield Park	Sussex	7
Mathskills II	Griffin	7
MDA-PCSS	MDA Assoc.	7
Mr T's Measuring Games	Ebury	7
Mr. Men	Mirror	*
Musicmaster	Sinclair	6
Nineteenth C. England	Sussex	8
Oil Strike	Sinclair Research	8
O Level Chemistry	Calpac	*
O Level Physics	Think Tank	*
Party Time	C. Tutor	*
Pathfinder	Widget	7
Pirate	Chalksoft	7
Postman Pat's Trail Game	Longman	7
Quick Thinking	Mirrorsoft	*
Riddle of the Sphinx	Longman	6
Run, Rabbit, Run	Longman	7
Sequences	Chalksoft	5
Snaffle	Longman	8
Spanish Gold	Chalksoft	*
Speak and Spell	S and G	*
Speech Marks	Sinclair	7
Spelling Bee	Image Systems	5
Star Reader	Scisoft	*
Startrucker	Widget	7
SuperTed	Longman	6
Teacher Data	B Farris	8
Tense French	Sullis	7
Time Traveller	Willey	*
Tuner	Soft Cottage	*
Wizard Box	Scisoft	*
Words and Pictures	Chalksoft	6
Wordsetter	Sinclair Research/ Macmillan	7
Word Wizard	Longman	6
Zoo	L'Ensouleiado	6

Language

Beta Basic	Betasoft	9
Forth	Melbourne House	9
Forth	Sinclair	7
48/80 Forth	E London Robotics	7
Hisoft C	Hisoft	9
Logo	Sinclair	9
Micro Prolog	Sinclair	8
Pascal Computer	Hi-Soft	*
Snail Logo	CP	8
Spec. Forth	Abersoft	9
Spec. Forth	CP	8
ZX Forth	Artic	8

Practical

Astronomer	CP Software	7
Beamscan	Beamscan	9
Computer Cookbook	Bug Byte	5
Cricket Averages	Spartan CC	7
Diet	dk'tronics	*
Diet Master	Diet Master	6
Dietician	Keysoft	4
First Aid	Eastmead	4
Football Pools	Hartland	*
How Long have you got?	Eastmead	6
I Ching	Salamander	7
I Ching	Sirius	*
Know Your Own Personality	Mirrorsoft	6
Love Oracle	Solar Publishing	5
Microfitness	$V0^2$	8
Spectadraw 2	McAlley	*
Star Gazer	CRL	8
The Complete Guide to Medicine	Eastmead	4
Vega-Table	Vega	7

Puzzle

Arcturus	Visions	7
Computaword	Work Force	2
Flix	Softricks	7
Hanoi King	Contrast	*
Hareraiser	Haresoft	3
Jumbly	dk'tronics	*
Mazecube	PAL	6
Stuart Henry's Pop Quiz	Bellflower	7
3D Strategy	Quicksilva	8

Simulation

American Football	Mind Games	7
Ashes	Pulsonic	7
Combat Lynx	Durrell	8
Cricket Captain	Allanson	6
Fighter Pilot	Digital Integration	*
Flight Simulation	Sinclair	6
Full Throttle	Micromega	8
Golf	Virgin	8
Heathrow Int ATC	Hewson Consultants	8
Howzat	Wyvern	8
Match Day	Ocean	6
Match Point	Sinclair	9
New Birkdale	Hornby	8
Olympics	CRL	6
Royal Birkdale	Ocean	8
Steve Davis Snooker	CDS Micro Systems	7
Strike Attack	Micromart	4
Super Soccer	Winters	4
Test Match	Comp. Rentals	6
The Forest	Phipps	7
Troon	Hornby	8
United	CCS	4
World Cup Football	Artic	7

Strategy

Airline	CCS	7
Angler	Virgin	6
Atram	PD Visual Marketing	5
Battle 1917	CCS	8
Battle of Britain	Microgame	*
Brewery	CCS	8
British Lowland	CCS	*
Caribbean Trader	E. Midland	7
Confrontation Master Programme	Lothlorien	7
Confrontation Scenarios Volume 1	Lothlorien	7
Conquest	Cheetasoft	6
Dix Mille	CCS	5
Fall of Rome	ASP	6
Football Manager	Addictive Games	7
Galaxy Conflict	Martech	8
Gangsters	CCS	8
Gatecrasher	Quicksilva	7
General Election	Bug-Byte	1
Grand Prix Manager	Silicon Joy	1
Great Britain Ltd	Hessel	7
Hunter Killer	Protek	9
It's Only Rock 'n' Roll	K-Tel	5
Johnny Reb	Lothlorien	*
King Arthur	E. Midland	*
Millionaire	Incentive	7
Mugsy	Melbourne House	8
New Venture	Falcon	4
1984	Incentive	7
Oligopoly	CCS	7
Plunder	CCS	8
Red Weed	Lothlorien	7
Reichswald	MW Gamesworld	3
Scatterbrain	Manor	3
Sheepwalk	Virgin	7
Special Operations	Lothlorien	8
Spectrealm	Runesoft	6
Star Trader	Bug-Byte	6
Stonkers	Beau Jolly	9
Super-League	Cross	6
Viking Raiders	Firebird	6
War 70	CCS	8
Whodunnit	CCS	8
Wilfred the Hairy	Microbyte	2

Traditional

Arcturus	Visions	7
Backgammon	CP Software	7
Brag	Turtle	7
Bridge Master	Serin	7
Bridge Player	CP Software	8
Bullseye	Mastertronic	4
Derby Day	CRL	5
Do Not Pass Go	Work Force	6
Double Dealer	MFM Software	5
Draughts	CP Software	7
Go To Jail	Automata	*
Grid run/Pontoon	Arcade	*
Mind Games	Oasis	7
Pontoon	Contrast	3
Roulette	Dymond	*
Scrabble	Sinclair	8
Snooker	Visions	*
Super Bridge	Buffer Micro	7
Superchess II	CP Software	8
Superchess III	CP Software	9
The Turk	OCP	8
Voice Chess	Artic	9
Yahtzi	Work Force	*
Yatzee	CP Software	5
ZX Draughts	CP Software	7
ZX Reversi	CP Software	7
ZX-Chess II	Artic	*

Utility

Allsort S-1	A Firminger	7
Assembler	Artic	6
Beyond Basic	Sinclair	5
Building Price	J Redman	6
Compiler	Softek	6
Composer	Contrast	2
FP Compiler	Softek	9
Games Designer	Quicksilva	7
HURG	Melbourne House	8
Keyword Extension	Timedata	8
Linked Software: Information Handling	McGraw Hill	3
Make Music	Buffer Micro	8
Melbourne Draw	Melbourne House	7
Monitor/Diss.	Sinclair	8
Music Maker	Bellflower	3
Paintbox	Print & Plotter	8
Print Utilities	Sinclair	7
Quill	Gilsoft	9
Screen Machine	ISP	7
Softalk 1-2	CP Software	8
Spec. Assembler	Artic	*
Spec. Compiler	Softek	7
Spectre Mac/Mon	Oasis	8
Spectrosim	Shiva	4
Spectrum Extended Basic	CP Software	7
Spectrum Monitor	Picturesque	7
Spectrum Sprites	ISP	8
Spectrum Super Toolkit	Nectarine	8
Supercode II	CP Software	8
The Complete Machine Code Tutor	New Generation	8
Vu3D	Sinclair	8
White Lightning	Oasis	9
Zeus Assembler	Sinclair	9

QL

Assembler Dev. Package	Metacomco	9
Pascal	Computer One	7
QL Chess	Psion	9
Quilmerge	Pitch Associates	5
Zkul	Talent Computer Systems	7

A & F Software, Unit 8, Canalside Industrial Estate, Woodbine Street East, Rochdale, Lancashire OL16 5LB
Abacus Software, 21 Union Street, Ramsbottom, Nr Bury, Lancashire
Abbex, 20 Ashley Close, Manor Hall Drive, London NW4
Abersoft, 7 Maesfallen, Bow Street, Aberystwyth, Wales
Activision, 15 Harley House, Marylebone Road, London NW1
Adder Publishing Ltd, PO Box 148, Cambridge CB1 2EQ
Add-on Electronics, Units 2,3 & 4, Shire Hill Industrial Estate, Saffron Walden, Essex CB11 3AQ
Addictive Games, 7a Richmond Hill, Bournemouth BH2 6HE
ADS, 8 Bronchurch Street, Portsmouth, Hampshire PO4 8RY
Allanson Computing, 77 Chorley Road, Adlington, Chorley, Lancashire PR6 9LH
Alligata Software, 1 Orange Street, Sheffield S1 4DW
APS 1 Golden Square, London W1
Arcade Software, Technology House, 32 Chislehurst Road, Orpington, Kent BR6 0DG
Arnold Wheaton, Parkside Lane, Dewsbury Road, Leeds LS11 5TD
Artic Computing, Main Street, Brandesburton, Driffield YO25 8RG
Automata UK, 27 Highland Road, Portsmouth, Hampshire P04 9DA
Axis, 71 Brookfield Avenue, Loughborough, Leicestershire LE11 3LN
Beau-Jolly, 19A New Broadway, Ealing, London W5
Bellflower Software, 6 Rosewood Avenue, Greenford, Middlesex UB6 7QP
Betasoft, 92 Oxford Road, Moseley, Birmingham B13 9SQ
Beyond Software, Lector Court, 151 Farringdon Road, London EC1
Bridge Software, 36 Fernwood, Marple Bridge, Stockport, Cheshire SK6 5BE
Bridgemaster, Sandymouth, Beeches Road, Farnham Common, Buckinghamshire SL2 3PS
Buffer Micro, 310 Streatham High Road, London SW16
Bug-Byte, Mulberry House, Canning Place, Liverpool L1 8JB
Calpac Computer Software, 108 Hermitage Woods Crescent, St Johns, Woking, Surrey
Campbell Systems, 57 Trap's Hill, Loughton, Essex 1G10 1TD
CCS, 14 Langton Way, Blackheath, London SE3 7TL
CDS Micro Systems, Silver House, Silver Street, Doncaster, South Yorkshire DN1 1HL
Century Communications, Portland House, 12-13 Greek Street, London W1V 5LE
Chalksoft, 17 Willowslea Road, Northwick, Worcester
Channel 8, 51 Fishgate, Preston, Lancashire PR1 8BH
Cheetahsoft, 24 Ray Street, London EC1R 3DJ
Clever Clogs, Argus Press Software Group, 1 Golden Square, London W1R 3AB
Collins, 18/20 Stephenson Way, North Gower Street, London NW1 2DX
Compusound, 32/33 Langley Close, Redditch, Worcester B98 0ET
Computatutor, 3 Thalia Close, Greenwich, London SE10 9NA
Computer One, 32 Science Park, Milton Road, Cambridge CB4 4DH
Contrast Software, Warren Road, Liss, Hampshire GU33 7DD
Cornhill Software, 2 Penrith Way, Aylesbury, Buckinghamshire HP21 7JZ
CP Software, 1 Glebe Road, Uxbridge, Middlesex UB8 2RD
Craig Communications, PO Box 46, Basingstoke, Hampshire
Creative Sparks, Thomson House, 296 Farnborough Road, Farnborough, Hampshire
CRL, 9 King's Yard, Carpenters Road, London E15 2HD
Cross Software, 36 Langford Crescent, Barnet, Hertfordshire EN4 9EH
Crystal Computing, 2 Ashton Way, East Herrington, Sunderland SR3 3RX
CSP Systems, 213 Stainbeck Road, Leeds
Database Publications, Europa House, 68 Chester Road, Hazel Grove, Stockport, SK7 5NY
D Pinch, 72 Norwood Crescent, Coldbrook, Barry, South Glamorgan
Digital Integration, Watchmoor Trade Centre, Watchmoor Road, Camberley, Surrey GU15 3AJ
DJL, 9 Tweed Close, Swindon, Wiltshire SN2 3PU
DK'tronics, Unit 6, Shire Hill Ind Est, Saffron Walden, Essex CB11 3AQ
Domark, 228 Munster road, London SW6
Dorcas Software, 3 The Oasis, Glenfield, Leicester
Doric Computer Services, 3 The Oasis, Glenfield, Leicester LE3 8QS
Dunitz, 154 Camden High Street, London NW1 0NE
Durrell Software, Castle Lodge, Castle Green, Taunton TA1 4AB
Dymond Software, 22 Hospital Road, Annan, Dumfriesshire DG12 5HP
Dynavision Production Studio, PO Box 96, Luton LU3 2JP
East London Robotics, St Nicholas House, The Mount, Guildford, Surrey GU2 5HN
Eastmead, Eastmead House, Lion Way, Camberley, Surrey GU16 5EZ
Ebury Press, Humphrey Bull & Barker, 62 Dean Street, London W1V 5HG
8th Day, 18 Flaxhill, Moreton, Wirral, Merseyside LU6 7UH
Electric Abacus, Oaklands House, Solartron Road, Farnborough, Hants
Elite Systems, 55 Bradford Street, Walsall, West Midlands WS1 3QD
Elm Computers, 59 Bateman Road, East Leake, Loughborough, Leicestershire LE12 6NN
Englefield Software, High House, Mill Street, Buxton, Norfolk NR10 5JE
Fantasy Software, Fauconberg Lodge, 27a St Georges Road, Cheltenham
Fawkes Computing, 41 Wolfridge Ride, Alveston, Bristol BS12 2RA
Felix Software, 19 Leighton Avenue, Pinner HA5 3BW
Fisher Software, 47 London Road, Buxton, Derbyshire
Front Runner, 620 Western Ave, London W3 0TU
Fulwood, 20 Templestowe Hill, Whitkirk, Leeds LS15 7EJ
Games Machine, 40 Fretherne Road, Welwyn Garden City, Hertfordshire AL8 6NU
Gamma Software, 12 Milverton Road, London NW6 7AS
Gargoyle Games, 4 North Western Arcade, Birmingham BS 5LH
Gavin Barker, 12 Fleming Field, Shotton Colliery, County Durham DH6 2JF
Gemini Software, 18a Littleham Road, Exmouth, Devon EX8 2QG
Gemtime Software, 16 Ben Ledi Road, Kirkcaldy, Fife KY2 5RP
Gilsoft, 30 Hawthorn Road, Barry, South Glamorgan, South Wales
Gouldstone, 45 Burleigh Avenue, Wallington, Surrey SM6 7UG
Granada Publishing, 8 Grafton Street, London W1X 3LA
Gremlin Graphics, Alpha House, 10 Carver Street, Sheffield S1 4FS
Griffin & George, Frederick Street, Birmingham B1 3HT
Haresoft, PO Box 365, London NW1
Harlequin Software, 43 Osprey Park, Thornbury, Bristol BS12 1LY
Hartland Software, 32 Ivor Place, London NW1 6DA
Heath Computing, 7 The Meadows, Flackwell Heath, Buckinghamshire HP10 9LX
Heinemann Computer Education, 22 Bedford Square, London WC1B 3HH
Hessel, 15 Lythan Court, Cadwell Crescent, Sunningdale, Berkshire
Hestacrest, PO Box 19, Leighton Buzzard, Bedfordshire LU7 0DG
Hewson Consultants, 56B Milton Trading Estate, Milton, Abingdon
Hilderbay, 8/10 Parkway, Regents Park, London NW1 7AA
Hilton Computer Services, 14 Avalon Road, Orpington, Kent
Hisoft, 180 High Street, Dunstable, Bedfordshire LU6 1AT
Hodder & Stoughton, PO Box 6, Dunton Green, Sevenoaks, Kent TN13 2XX
Homestudy Ltd, Treleigh Woods Farm, Treleigh, Redruth, Cornwall TR16 4AW
Hornby Software, 21 Penfold Hill, Leeds LS15 0PW
IMS Software, 143/145 Uxbridge Road, Ealing, London W13 9AV
Image Systems, 34 Lynwood Drive, Worcester Park, Surrey KT4 7AB
Incentive, 54 London Street, Reading, Berkshire RG1 4SQ
Inform Software, 3 Treesdale Close, Birkdale, Southport PR8 2EL
Interstella Software, 82 New Forest Drive, Brockenhurst, Kent
ISP Marketing Ltd, Crown Hill, 38B High Street, Godalming, Surrey GU7 1DZ
JK Greye Software, 16 Park Street, Bath, Avon BA1 2TE
JRS Software, 19 Wayside Avenue, Worthing, Sussex BN13 3JH
K-Tel International (UK), 60 Western Avenue, London W3 0TU
Kemp, 43 Muswell Hill, London N10 3PN
Keysoft, 6 Bruce Grove, Tottenham, London N17
Kosmos Software, 1 Pilgrims Close, Harlington, Dunstable, Bedfordshire LU5 6LX
Kuma Computers, 12 Horseshoe Park, Pangbourne, Berkshire RG8 7JW
Learning Systems, 11 Warwick Court, Princes Drive, Harrow, Middx HA1 4UB
Legend, PO Box 435, London E4 7LX
Lerm, 10 Brunswick Gardens, Corby, Northamptonshire
Level Nine, 229 Hugenden Road, High Wycombe, Buckinghamshire HP13 5PG
Logic 3, Unit 18, Wye Ind Est, London Road, High Wycombe, Buckinghamshire
Longman, Longman Group, Longman House, Harlow, Essex CM20 2JE
Lothlorien, 56a Park Lane, Poynton, Stockport, Cheshire SK12 1RE
Manor Software, 24 Manor Gardens, London SW20
Martech Games, 9 Billingburgh Road, Eastbourne, East Sussex BN20 8LY
Mastertronic, (as for Mastervision)
Mastervision, Park Lorne, 111 Park Road, London NW8 7SL
McAlley, 1 Cowleaze, Chinnor, Oxfordshire OX9 4TD
McGraw Hill, Shoppen Hangers Road, Maidenhead, Berkshire
Medidata, PO Box 26, London NW9 9BW
Melbourne House, Castle Yard House, Castle Yard, Richmond TW10 6TF

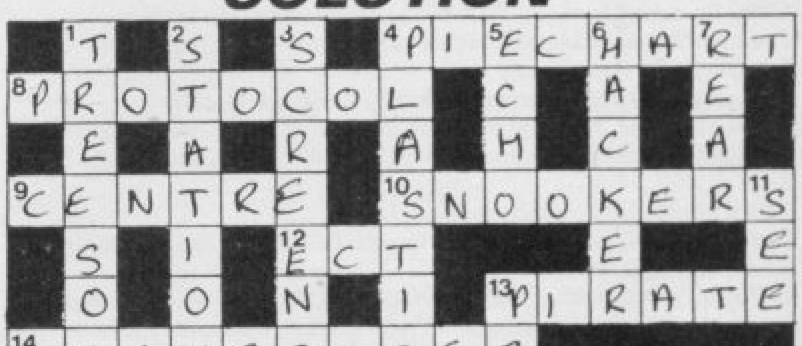
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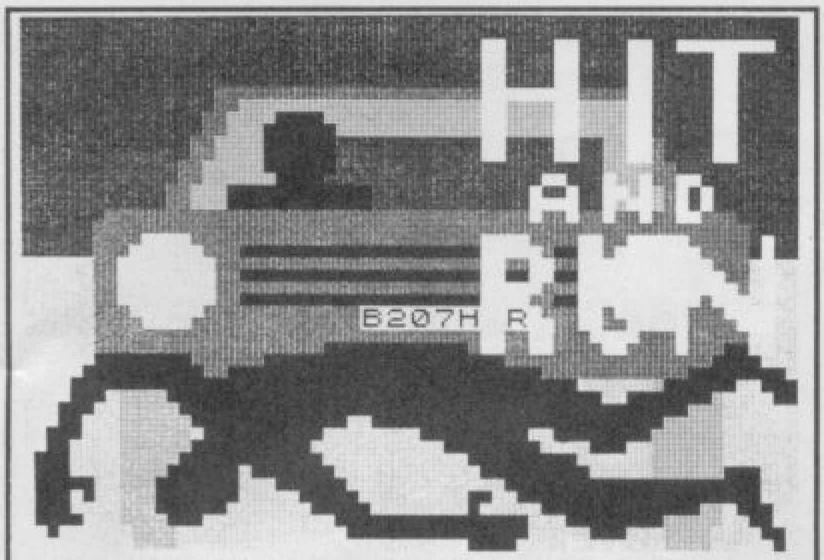
Software Publishers

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Metacomco, 26 Portland Square, Bristol BS2 8RZ
Micro Dealer UK, Unit 6 Marlborough Road Trading Estate, Lattimore Road, St Albans, Hertfordshire
Micro Wish, PO Box 15, Colne, Lancashire BB8 9DB
Microbyte, 19 Worcester Close, Lichfield, Staffordshire
Microcosm, 68 The Glade, Clayhall, Ilford
Micromania, 14 Lower Hill Road, Epsom, Surrey KT19 8LT
Micromega, 230/236 Lavender Hill, London SW11
Microsphere, 72 Rosebery Road, London N10 2LA
Mikro-Gen, 44 The Broadway, Bracknell, Berkshire RG12 1AG
Minatron Computing, 34 Pinewood Close, Westbury on Trym, Bristol BS9 4AJ
Mirrorsoft, PO Box 50, Bromley, Kent BR2 9TT
Monitor Software, PO Box 442, London NW7 2JF
Mosaic, 187 Upper Street, London N1 1RQ
MW Gamesworld, 12 Lawnswood Avenue, Chasetown, Walsall WS7 8YD
Myrmidon Software, PO Box 2, Tadworth, Surrey, KT20 7LU
Naigram Software, c/o Soho Synth House, 18A Soho Square, London W1V 5FB
Nectarine, 837 Yeovil Road, Slough SL1 4JH
New Generation Software, FREEPOST, Bath BA2 4TD
Newsoft, 12 White Broom Road, Hemel Hempstead, Hertfordshire
NTD Software, 19, Radipole Road, London SW6
Oasis Software, 9a Alexandra Parade, Weston-Super-Mare, Avon BS23 1QT
Ocean Software, 6 Central Street, Manchester M2 5NS
OCP, 4A High Street, Chalfont St Peter, Buckinghamshire SL9 9QB
Orwin Software, 26 Brownlow Road, Willesden, London NW10 9QL
PD Visual Marketing, Thanet House, Craven Road, London W2
Penguin, 536 King's Road, London SW10
Phipps Associates, 172 Kingston Road, Ewell, Surrey
Phoenix Publishing, 14 Vernon Road, Bushey, Hertfordshire WD2 2JL
Picturesque, 6 Corkscrew Hill, West Wickham, Kent BR4 9BB
Pitch Associates, Rockleigh Avenue, Leigh-on-Sea, Essex
Pooter Games, 24 Parsloes Avenue, Dagenham RM9 5NX
Poppysoft, The Close, Common Road, Headley, Newbury, Berkshire
Positive Image Software, 129 Dumbarton Road, Glasgow
Postern Software, PO Box 2, Anderovers Ford, Cheltenham, Gloucester GL54 5SW
Print 'n' Plotter Products, 19 Borough High Street, London SE1 9SE
Protek Computing, 1a Young Square, Brucefield Ind Park, Livingston, West Lothian
Psion, 2 Huntsworth Mews, Gloucester Place, London NW1
PSS, 452 Stoney Stanton Road, Coventry CV6 JDG
Pulsonic, Warwick Distribution Ltd, 3 Standard Road, Park Royal, London NW10 6EX
Quest International Computer Systems, Gillingham House, 38-44 Gillingham Street, London SW1
Quicksilva, Palmerstone Park House, Southampton, Hampshire S01 1LL
RAM Writer, 3 Vumba House, 2 Cedar Gardens, Sutton, Surrey
Ramtop Services, 5 Rue D'Artois, 75008, Paris, France
Red Shift, 12c Manor Road, Stoke Newington, London N16 5SA
Romantic Robot, 113 Melrose Avenue, London NW2 4LX
Romik Software, 272 Argyll Avenue, Slough SL1 4HE
Rose Software, 148 Widney Lane, Solihull, West Midlands
Runesoft, Charnwood House, Crossgate Drive, Nottingham NG2 TLW
Salamander Software, 27 Ditchling Rise, Brighton, East Sussex BN1 4QL
Scisoft, 5 Minister Gardens, Newthorpe, Eastwood, Nottingham NGJ6 2AT
SCR Adventures, 190 Shelbourne Road, Tottenham, London
SD Microsystems, PO Box 24, Hitchin, Hertfordshire SG4 0AE
Selec Software, 37 Councillor Lane, Cheadle, Cheshire
Serim Software, Freepost, Dept SU7, PO Box 163, Slough, Berkshire SL2 3YY
Shards, Suite G, Roycraft House, 15 Linton Road, Barking, Essex
Shepherd Software, Elm House, 23-25 Elmshott Lane, Chippenham, Slough, Berkshire
Shiva Publishing, 64 Welsh Row, Nantwich, Cheshire CW5 5BR
Silversoft, London House, 271/273 King Street, London W6 9LZ
Sinclair Research, 6 Kings Parade, Cambridge
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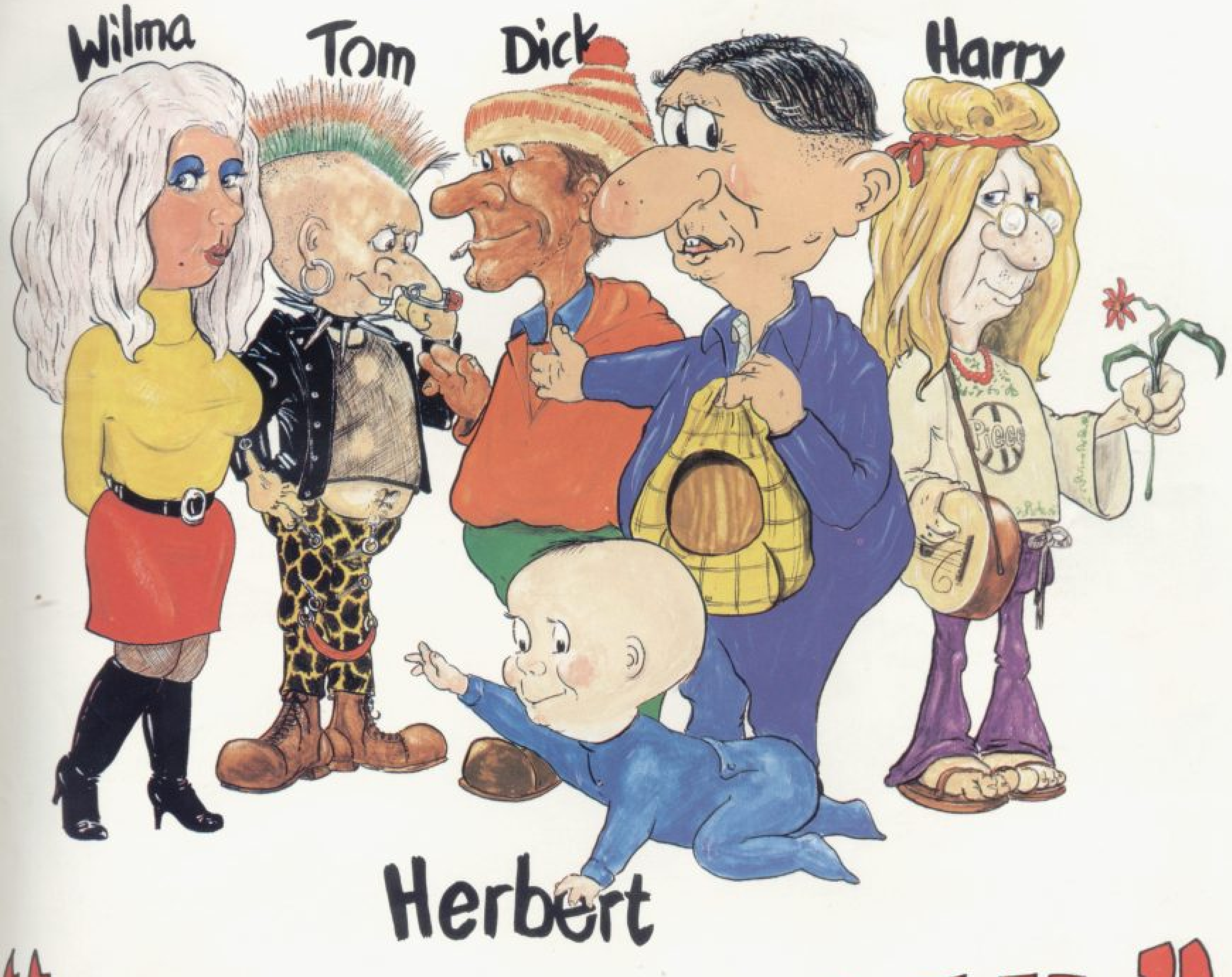
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